Days River Watershed Management Plan

September 2006

Delta Conservation District
2003 Minneapolis Ave
Gladstone, MI 49837
906-428-4076

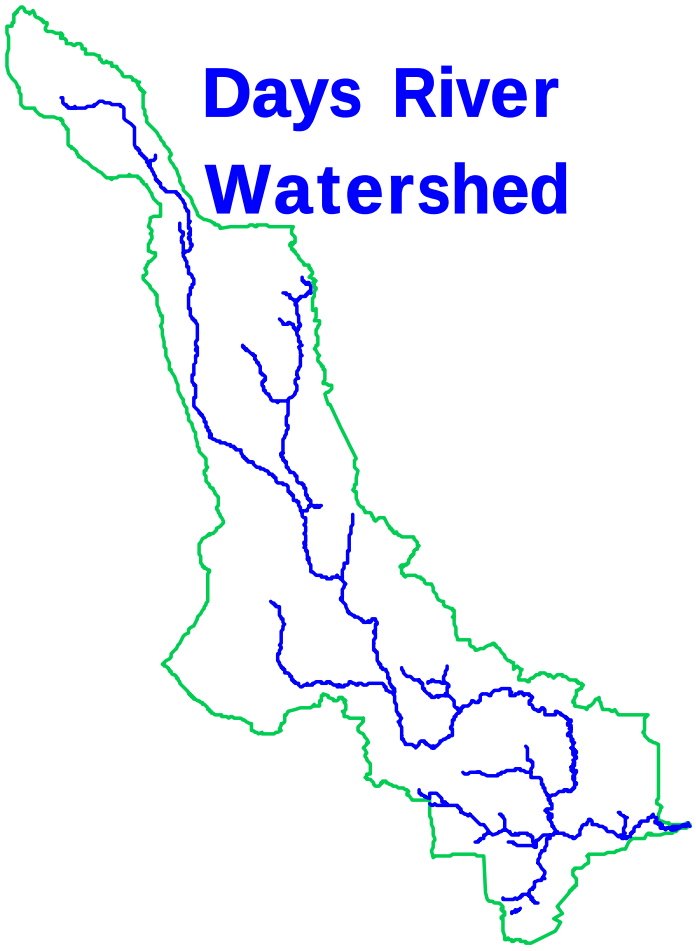


Table of Contents

List of Figures, Tables, and Appendixes

Figures

Tables

Appendixes

Introduction

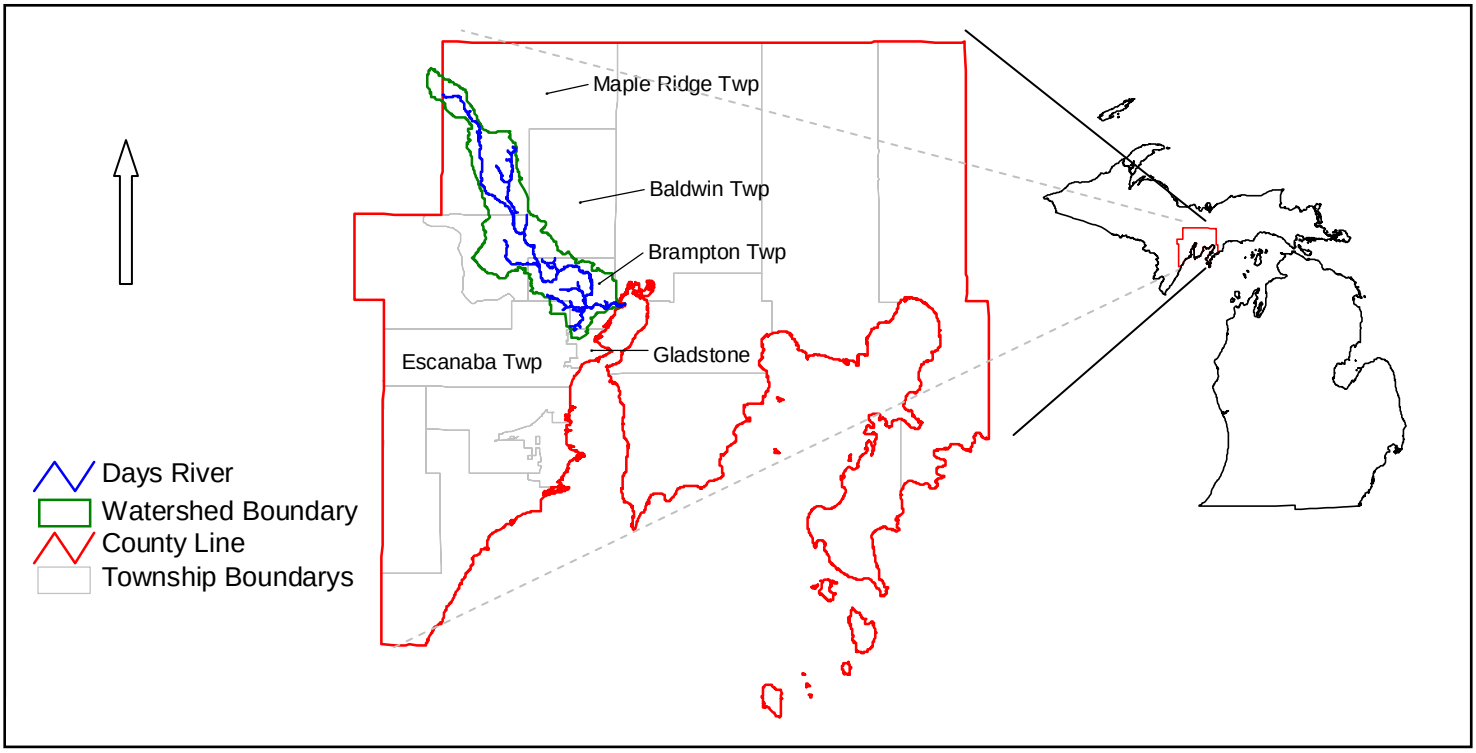
Watershed management takes a holistic approach to natural resource protection and management, focusing on all the activities within the watershed boundaries that can impact water quality. A watershed is defined as all of the land area that drains into a common point such as a lake or river. Rainwater and snowmelt run off the land, picking up pollutants along the way and deposits them into lakes and rivers. Preserving the character and function of the watershed is the fundamental purpose of watershed management planning.

The primary goal of this plan is to protect and improve the water quality within the Days River Watershed. Other goals include educating watershed residents on how they can work to improve and protect water quality; improving recreational opportunities on the river, and developing land-use strategies that will protect water quality in the future. This management plan is designed to provide long-term water quality and aquatic habitat benefits to the Days River, its tributaries, and Little Bay De Noc. In addition to the environmental benefits associated with proper watershed management, this approach can help to shape the "urban splatter" patterns of an area to ensure they are sustainable. Such careful planning practices can result in not only the protection of the environment, but the quality of life for the residents of the watershed as well.

This management plan includes an inventory and analysis of the watershed. It also includes a discussion of specific areas of concern and their effects on the health of the watershed. From the inventory conducted on the natural features, the watershed council prioritized these areas based on human disturbances (altered hydrology, nutrient inputs, transportation issues, and recreational activities). Finally, a series of goals and objectives are presented. Using the goals and objectives presented an action plan is offered. The action plan is designed to allow local communities to continue their growth without compromising the environmental quality and designated uses of the watershed. This project was made possible with funding from a Section 319 Grant through the Department of Environmental Quality, Surface Water Quality Division.

Background

Figure 1 Watershed Location Map

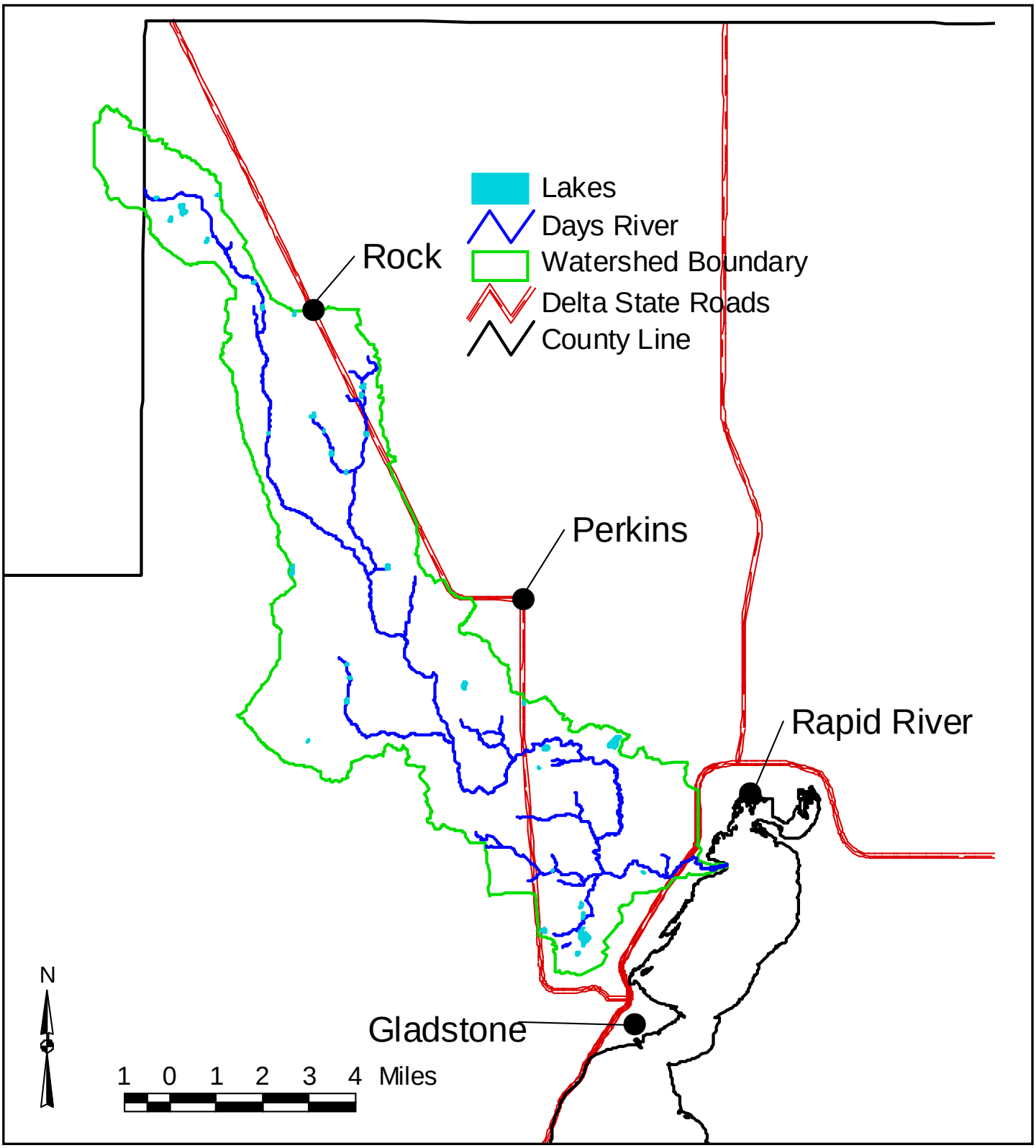


Location

The Days River Watershed lies within the Little Bay De Noc drainage area. It is located in the central region of Michigan's Upper Peninsula in Delta County with a small section of the headwaters in Marquette County. The Days River Watershed refers to all the land area that is drained by the Days River. The Headwaters of the Days River begins in Ewing Township, of Marquette County. The Days River flows southeast near Rock, Perkins, Brampton, and Kipling, where the mouth of the river drains into Little Bay De Noc. The Days River Watershed is a mid-sized watershed. The river is approximately 61 linear miles in length including the East and West Branches and eight other small tributaries.

The total watershed surface area encompasses approximately 40,594 acres or 63 square miles, 15,600 acres of which is public land. The watershed encompasses parts of Maple Ridge, Baldwin, Brampton, and Escanaba Townships and a portion of the City of Gladstone.

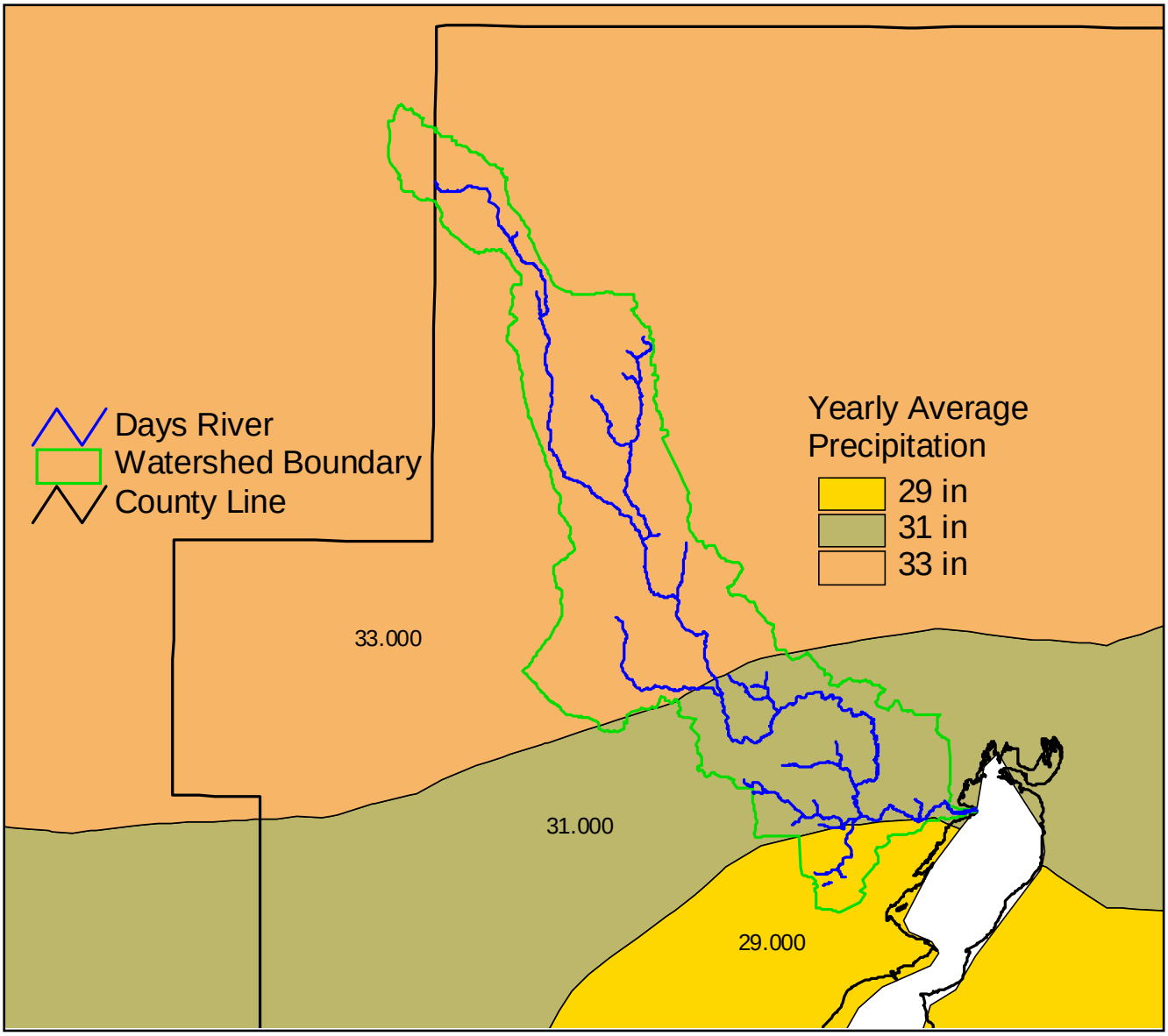
Figure 2 Days River Watershed



Precipitation Characteristics

Due to the proximity to Lake Michigan and Lake Superior, the watershed has a varied climate. The climates range from quasi-marine near the lakes, to semi-continental inland. The average snowfall is about 55 inches in the southern part near Lake Michigan. Summers are pleasantly cool because of the lake breeze. Temperatures range from highs near 90 F and lows near -28 F. Summer averages are near 70 F. Winter averages are near 0 F. The growing season averages 120 days, but it ranges from about 80 days in the interior nearly 140 days near the lakeshore (USDA 1994).

Figure 3 Precipitation Map



Precipitation is heaviest during the growing season. It averages 60 percent of the annual total during the 6 month period from April through September. In Escanaba for the last 30 years, the greatest amount of precipitation ever received in a one month period was 9.93 inches in July,

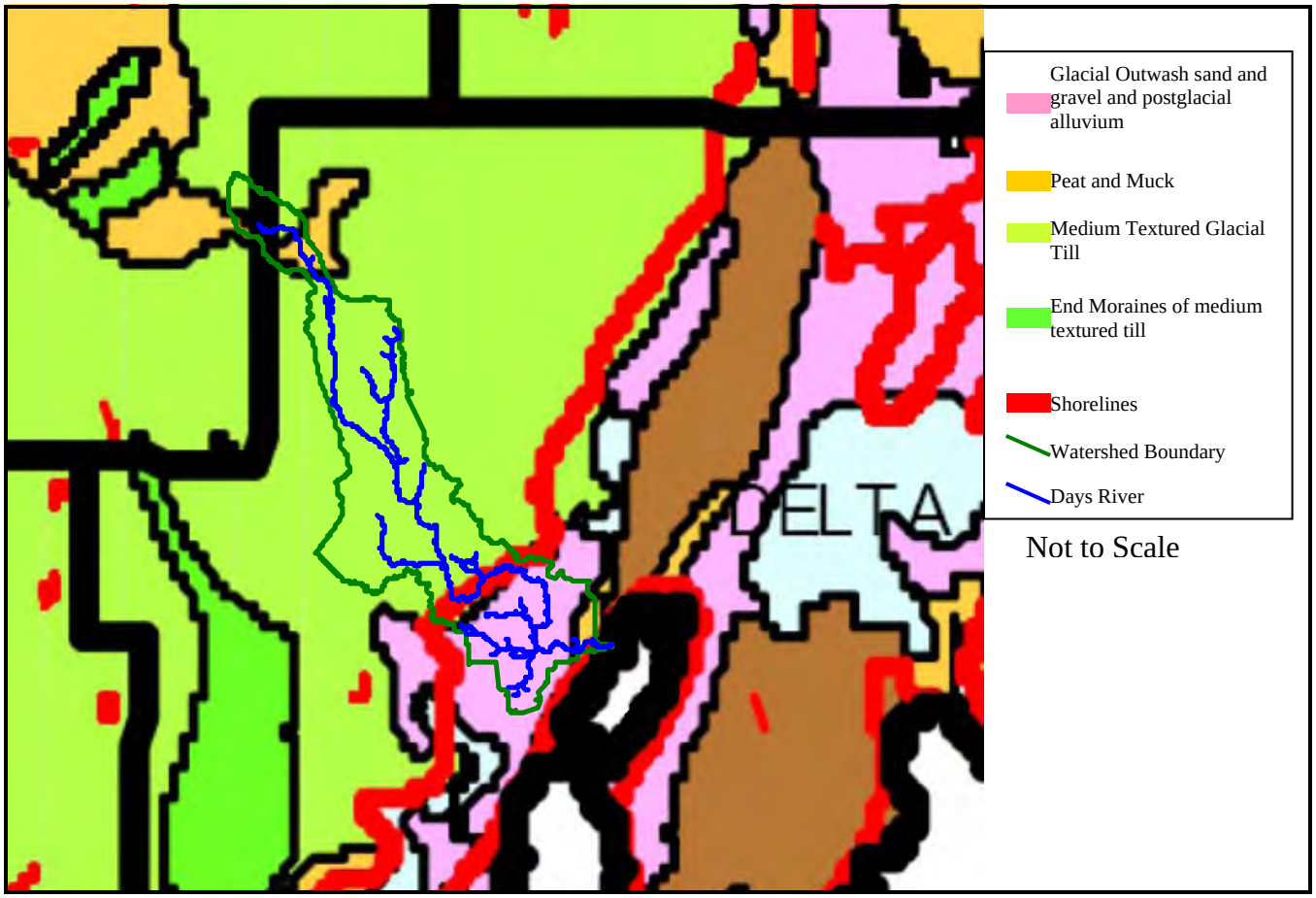
1951. The driest month on record was October 1952, when only .07 of an inch of precipitation was measured. As much as 1.1 inches of precipitation in one hour, 1.3 inches in two hours, and 2.3 inches in 24 hours falls about once in two years. Twenty-four hour amounts of 3.3 inches and 4.2 inches occur about once in 10 years and once in 50 years, respectively (USDA 1994).

Evaporation data indicates an average evaporation total during the period of May to October of 26 inches. This is about 140 percent of the normal rainfall total of 18.64 inches experienced in the same 6 month period. Recharge of the soil's water supply occurs in winter and early spring. The capacity of the soil to hold this moisture to supplement rainfall plays an important part in the farming practices of the area, particularly in summer when the demand for water is higher (USDA 1994).

Topography and Soils

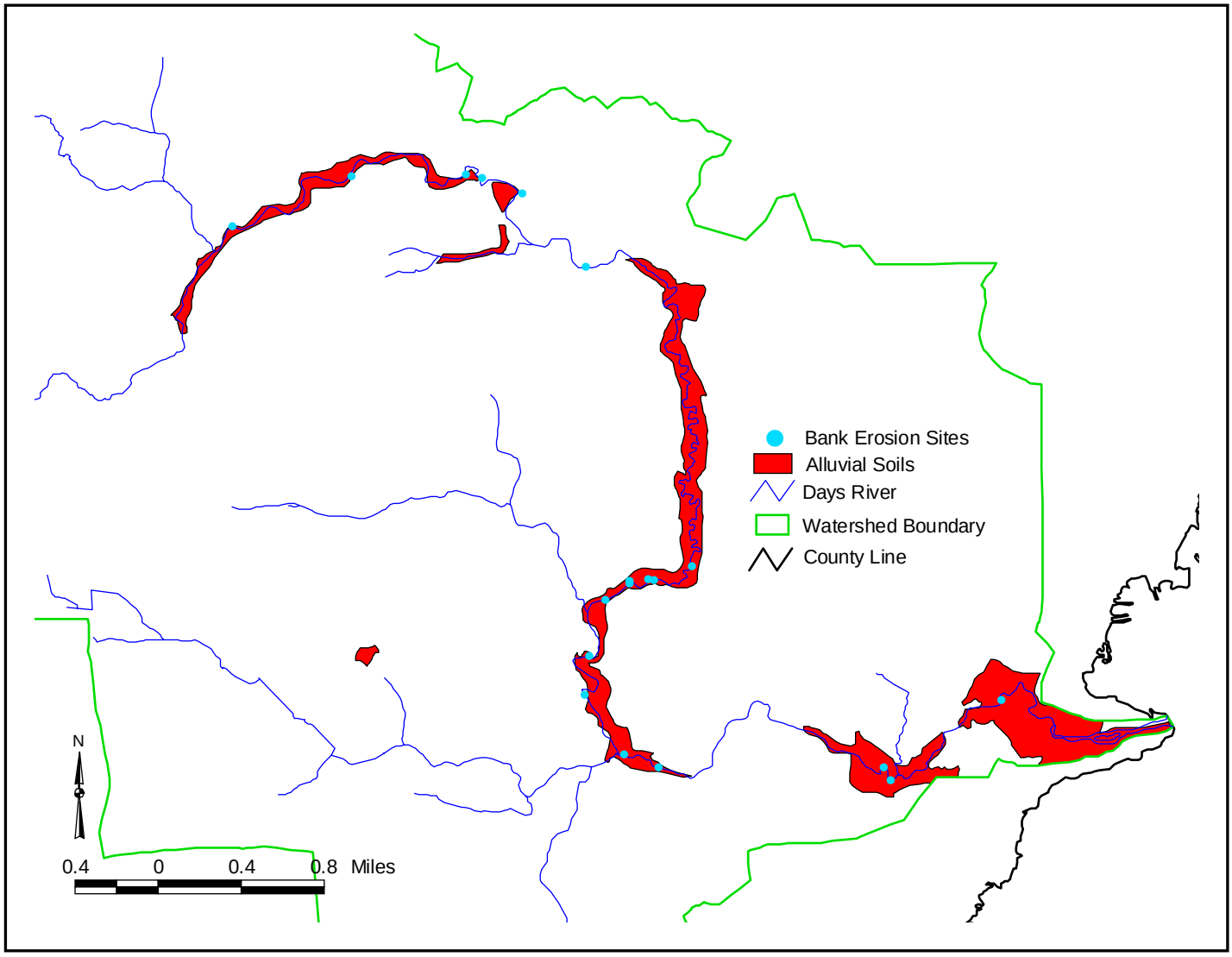
The geology within the watershed dates back to the Ordovician period, between 438 and 505 million years ago. The bedrock layers exposed in areas are the Trenton Group limestone and the Black River Group limestone. In some areas of the watershed, these layers are the river's bed and can be clearly seen. The limestone river bed can limit the downward cutting of the river forcing it to cut a wider path, causing erosion problems.

Figure 5 Surface Geology



As the last of the glacial ice from the Pleistocene Epoch retreated from the area, another layer of geology was left. This layer is the current Surface (Quaternary) Geology we see now. The Surface Geology of the watershed consists of glacial outwash sand and gravel, postglacial alluvium, peat and muck, and medium textured glacial till. Two historic shorelines run through the watershed (see Figure 5 Surface Geology). This geology is evident throughout the watershed. As the Days River passes through the area known locally as the bluff, the historic shorelines become evident with the exposed sandy soils.

Figure 6 Alluvial Soils



The resulting landscape has a gradual slope from the headwaters southeast towards the mouth of the river on Little Bay De Noc. The elevation change from the headwaters to the mouth of the river is approximately 423 ft. The Days River topography can be viewed on the Cornell, Perkins, Helena, Swimming Hole Creek, Rock, Rock SE, Rapid River, and Gladstone 7.5 min Topographic Maps. The major area of steep slopes is the historic shoreline (the bluff)

approximately two miles upstream from the mouth of the river. In these areas the river has down-cut the river bed to an even gradient. There are no falls or large rapids along the river.

The soils within the Days River Watershed range from well drained sandy soils to poorly drained muck soils. The Soil Survey of Delta County and Hiawatha National Forest of Alger and Schoolcraft Counties of Michigan indicate the presence of 56 soil mapping units within the watershed boundary. The soil types and number of acres are listed in Appendix B Soils.

The Alluvial Land soil mapping units are considered a priority area due to the number of erosion sites contributing large amounts of sediment to the river system (see Figure 6 Alluvial Soils).

Hydrology

The Days River Watershed is a mid-sized watershed. The river is approximately 61 linear miles in length including the east and west branches and 8 other small tributaries (see Figure 2 Days River Watershed). The Days River is classified as a second order coldwater fishery. The river has many large cobble riffle sections which provide excellent colonization habitat for aquatic insects. Summer base flows are low due to the minimal groundwater contribution (Taft 1991).

There are two named lakes and 55 other unnamed lakes, ponds and impoundments within the Days River Watershed. The largest lakes are Lake Minnewasca at 23 acres and Brampton Lake at approximately 21 acres. The remainder of the lakes, ponds, and impoundments range in size from .1 acres to 7 acres. Impoundments are created along the river by beaver dams and three man-made weirs. The lamprey weir within the Days River Recreational area is owned and maintained by the state. Maple Ridge Township owns and maintains a weir to create an impoundment for a community swimming area. The third weir is privately owned, and rendered inoperable by a beaver dam downstream. A large quantity of the small ponds, are man-made and are not directly linked to the Days River. Others are natural wetland area type ponds that may drain into the Days River at times of high water.

National Wetland Inventory indicates three wetland types within the Days River Watershed covering 19,160 acres of the watershed. The most prevalent wetland type is forested, covering over 16,900 acres. Emergent wetlands make up over 860 acres and scrub shrub wetlands comprise 1,400 acres of the watershed. The land use map below (Figure 10 Watershed Land Use) is a MIRIS land use map from 1978 and does not distinguish between forested wetlands and upland forest. It is all displayed as forested. Wetlands shown refer to scrub shrub, and emergent wetlands.

Groundwater is the primary source of drinking water within in the Days River watershed. Groundwater and surface water are closely linked, and any contamination of one has the potential to significantly impact the other. It also supplies much of the water in the mainstream and tributaries of the Days River. Seeps and spring fed streams can be seen along the banks during the summer. This helps keep water temperatures relatively cold, even in the summer. With lowered water table levels groundwater contribution is minimal and off-set by shallow waters being heated more easily. In forested areas good canopy cover helps to prevent elevated water temperatures.

Peak stream flow during large storm events varies. The Table 1 Discharge Stream Flow, Frequencies and Cubic Feet per Second Flow Rate list the different flow rates for a given storm event. The locations for each of these data points were selected based on natural river features off a map (see Figure 8 Discharge Data Point). For example data point one was selected because it would show the peak flow for the whole watershed, data point 81 will show peak flow for the east branch of the Days River. Knowing peak flow rates is important when determining the best management practices need for stream restoration.

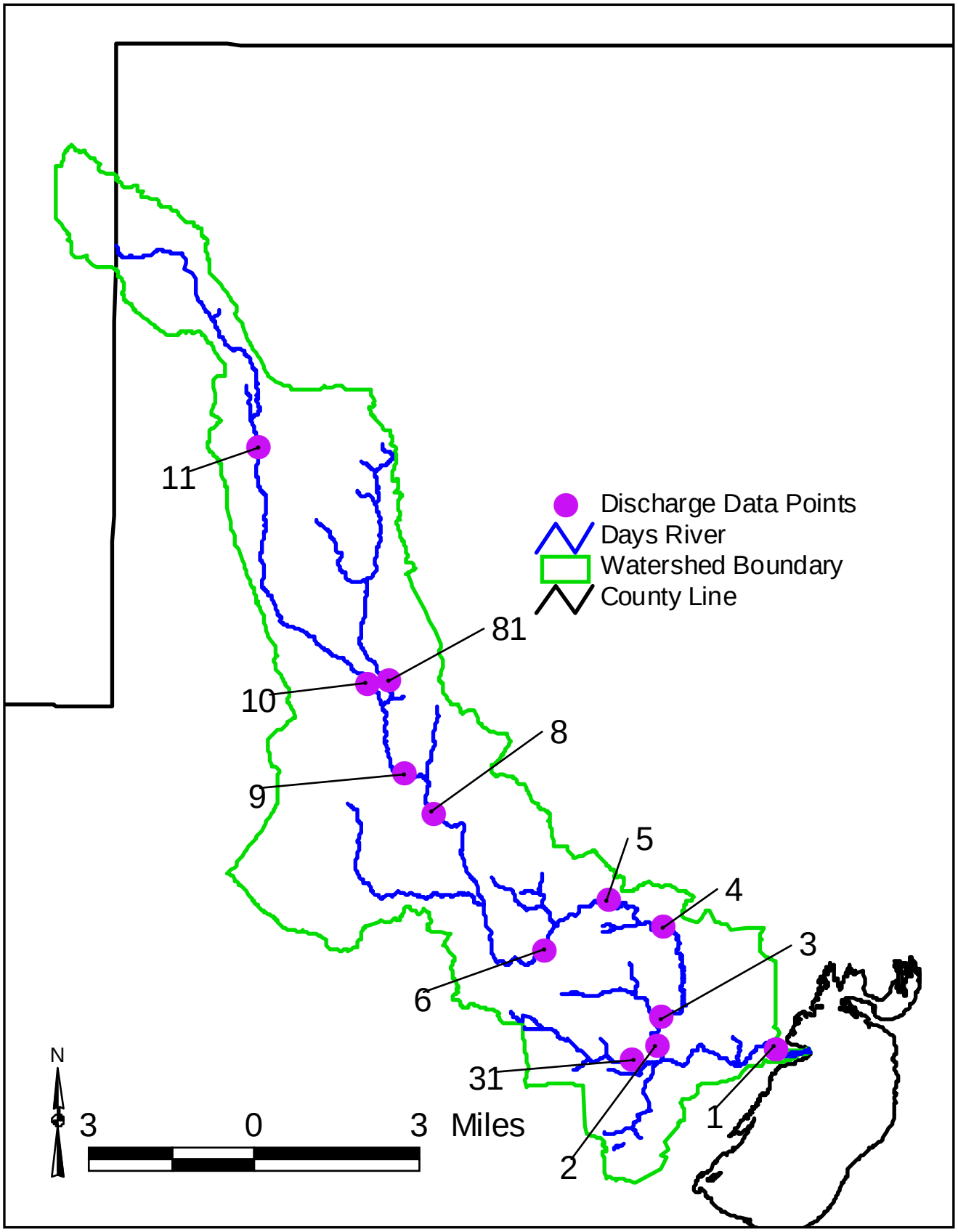
Table 1 Discharge Stream Flow, Frequencies and Cubic Feet per Second Flow Rate

Data Point	2 year	25 year	50 year	100 year
1	700	1500	1600	1900
2	500	1200	1400	1600
3	550	1200	1300	1500
4	490	1100	1300	1500
5	430	900	1000	1200
6	390	800	850	1000
8	230	500	600	700
9	220	490	550	650
10	30	200	270	360
11	30	180	250	340
31	10	70	100	130
81	35	210	280	380

*Calculations completed by Michigan Department of Environmental Quality

Figure 7 Spring snow melt at data point 1

Figure 8 Discharge Data Point



Land Use and Development Trends

The estimated population for Delta County in 1999 was 38,848 people. Population in 2000 was 38,520 people. Population in 2003 is estimated at 38,317 people. This is a -.5% change from April, 2000 to July, 2003. The number of people within Delta County has been fairly stable for the last three to four years; however there has been a change in land use. The estimated number of people per square mile is 32.9 (USCB 2004). People within the urban areas have been moving outward toward the rural forested areas more and more over the last decade. This trend of "Urban Splatter" puts increased pressure on the watersheds ability to deal with large runoff events. People building homes, garages, and paving driveways reduces the amount of infiltration and increase the amount of stormwater runoff during each rain event. This can also increase the amount and risk of failing septic systems that can negatively affect the watershed.

Figure 9 Wildlife and People using the river side by side.

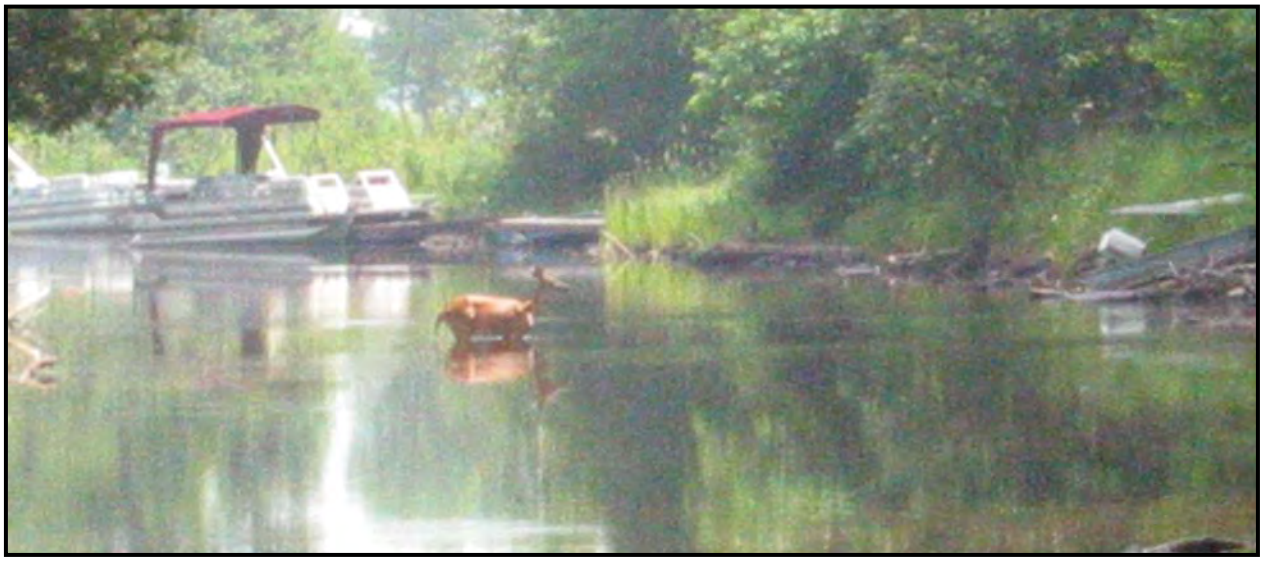
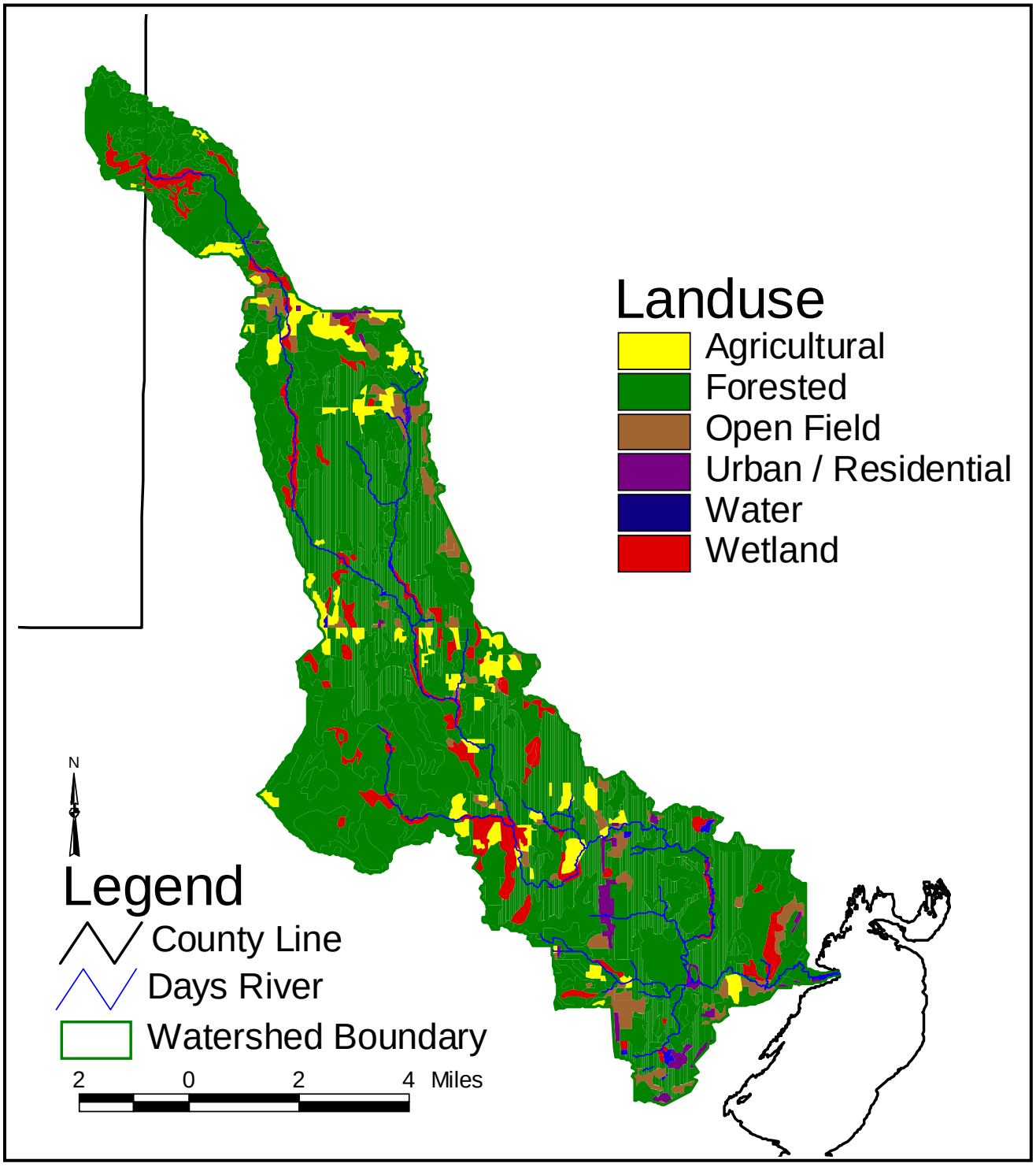


Figure 10 Watershed Land Use

*Land use data taken from Land Cover / Use MIRIS 1978



Water Quality Status

Designated Uses

Designated uses are recognized uses of water established by state and federal water quality programs. In Michigan, the goal is to have all waters of the state meet all designated uses. The Days River is listed on the DEQ attainment list for meeting all of the listed designated uses. The current designated use list for Michigan consists of the following:

- Agriculture: Maintain the water supply for agricultural use. The current agricultural use within the watershed is limited to small farms and/or hobby farms. There are currently no limitations to agriculture within the watershed at this time.
- Industrial water supply: Maintain the water supply for industrial use. Water quality is high enough that it does not eliminate potential industrial use.
- Public Water Supply at the point of intake: Townships and towns within the watershed use groundwater as their source of potable water. The Days River is used as a water supply for fire department dry hydrants. Water quality is high enough that it does not eliminate potential for serving as a public water supply.
- Navigation: Navigation along the Days River is possible during higher water levels, with the exception of large log jams blocking the width of the river in several locations. There is currently no public water access sites located on the Days River for boaters to safely and easily put in or take out.
- Warm-water fishery: Maintain and improve warm water fisheries. Streams and portions of the main river are known to support warm water fish. Spawning areas are threatened by sediment loading and increased nutrient levels. Pollutants of concern relating to warm-water fisheries include sediment, nutrient loading, and salinity.
- Cold water fishery: Maintain, improve, and restore cold water fisheries. The Days River main stream and all tributaries are classified as a coldwater fishery, between the mouth of the river upstream to the bridge on M-35. This area of the stream is known to support cold water fish habitat. Spawning areas are threatened by sediment and nutrient levels. Pollutants of concern include sediment, nutrient loading, temperature, altered hydrologic flow, and salinity.
- Other indigenous aquatic life and wildlife: Maintain and improve habitat for other indigenous aquatic species. The Days River Watershed supports a variety of aquatic and wildlife species. A large variety of species were observed during the field survey of the river. Pollutants of concern include temperature, sedimentation, altered hydrologic flow, and salinity.
- Partial body contact recreation: Maintain and improve partial body contact. Waters are considered suitable for partial body contact recreation, with minimal threat to public health due to water quality. Two locations along the river may be threatened due to the potential for high levels of bacteria contamination. Further testing needs to be completed to substantiate this concern. Pollutants of concern include possible E. Coli bacteria.
- Total body contact recreation between May 1 and October 31: Maintain and improve full body contact. All waters within the Lower Days River Watershed are considered suitable for full body contact during the recreation season. Two locations along the river may be threatened due to the potential for high levels of bacteria contamination. Pollutants of concern include possible E. Coli bacteria.

Table 2 Designated and Existing Uses (Pollutants are ranked on a hole over the entire watershed. Sources in this table are ranked per Designated Use.)

Designated/Existing Uses	Designated Use: Met (M), Impaired (I), Threatened (T)	Priority Ranking (High, Medium, Low)	Pollutants Ranking over all	Source Ranking per pollutant
Agriculture:	M	Low		
Industrial water supply	M	Low		
Public water supply	M	Low		
Navigation	T	Medium	NA	2-Natural tree fall 3-Beaver Dams, activity 4-Streambank erosion 1-Whole stream log jams.
Warm water fishery	T	Medium	1-Sediment 2-Nutrients 7-Salinity	3-Streambank erosion 5-Road stream crossings 1-Failing septic system 2-Septic lagoon discharge 6-Livestock near stream 4-Lawn Fertilization runoff
Cold water fishery	T	High	1-Sediment 2-Nutrients 4-Temperature 5-Altered hydrologic Flow 7-Salinity	3-Streambank erosion 9-Road stream crossings 1-Failing septic system 3-Septic lagoon discharge 10-Livestock near stream 4-Lawn Fertilization runoff 6-Lack of Vegetative buffer 7-Minimum groundwater Contributions 8-Shallow & Wider Stream channel 5-Altered riparian

Designated/Existing Uses	Designated Use: Met (M), Impaired (I), Threatened (T)	Priority Ranking (High, Medium, Low)	Pollutants Ranking over all	Source Ranking per pollutant
				areas
Other indigenous aquatic life	M	High	4-Temperature 5-Altered hydrologic Flow 7-Salinity 1-Sediment	4-Lack of Vegetative buffer 5-Minimum groundwater Contributions 2-Shallow & Wider Stream channel 1-Altered riparian areas 3-Non-native species 6-Trash and other human debris Road Stream Crossing 3-Streambank erosion
Partial body contact	T	High	3-Possible E. Coli	1-Failing septic system 2-Septic lagoon discharge
Total body contact	T	High	3-Possible E. Coli	1-Failing septic system 2-Septic lagoon discharge

Desired Uses

Desired uses have also been identified for the Days River Watershed. Some of the desired uses may not have a direct impact on water quality, however it is still important to recognize and consider these uses in the watershed management plan. We visited with landowners during the river inventory phase of the project. During those visits we asked the landowners what they would like to see as desired uses of the river system. Their comments were used in the development of the desired uses. Steering committee members were also polled to determine what they felt should be the desired uses of the river system.

1. Maintain and improve state designated uses.
2. Maintain and improve groundwater drinking supplies.
3. Improve navigability within the main stream.
4. Maintain and improve the recreational areas and opportunities along the Days River.
5. Reduce the amount of invasive species found within the watershed.
6. Increase public awareness of invasive species.

Pollutants of Concern

As mentioned, in Table 2 Designated and Existing Uses, the pollutants of concern within the Days River Watershed consist of sediment, nutrients, and E Coli, come from nonpoint source pollutants. Nonpoint source pollution is water pollution caused by storm water runoff, air deposition, groundwater infiltration and altered hydraulic flow. Sediment, fertilizers, bacteria, toxic chemical, oils, and other by products of watershed development degrade water resources. Roads, driveways, parking lots, farms, lawns, and septic systems are common nonpoint sources. All are widespread throughout the watershed making nonpoint source pollution a cumulative problem that cannot be solved on a site-by-site basis. The pollutants of concern have been prioritized based on the data collected during the field inventory of the river. This ranking is based on the entire watershed.

Sediments

Sediments are ranked number one pollutant within the watershed. Sediment deposition in trout streams is a chronic problem in many cold water systems. The portion of the Days River that is designated by the Department of Natural Resources as cold water fisheries is no exception. As streambanks erode, or storm water runs off carrying sediments from road stream crossings, sediments are deposited into the waterway. Sediments in the Days River are primarily a result of bank erosion. These sediments have detrimental effects on all aquatic species, including trout.

Sediments can have several impacts on stream systems. Excess sediments cover natural stream and lake substrate and increase water turbidity. These impacts are harmful to aquatic life. Many fish and prey species require a stable stream bottom and exposed woody debris for spawning and feeding. Turbid stream flows can dislodge fish eggs and insect prey. In some stream systems the amount of sediments removed is greater than or equal to the amounts of sediments being deposited. When deposition is greater, water levels are raised causing more streambank erosion, and potential flooding. This is the case within the priority area of the Days River watershed. Sandy soils eroded from stream banks cover fish habitat and create shallow areas and sand bars. These areas become shallower and tend to widen the stream. Sedimentation within the watershed comes from several sources. Streambank erosion is the main source within the watershed. This erosion is caused by a change in hydrology, human access to the river along the sandy banks, and runoff from road stream crossings. Lack of a vegetative buffer is also a contributing factor. Bare soil banks and buffer zones allow increased runoff to enter the streams at a higher velocity causing stream banks to erode at an accelerated rate. Road stream crossings also contribute to a portion of the sedimentation within the watershed. Approaches that are not sloped to allow runoff into the near by roadside ditches allows runoff to build up in velocity and pick up sediments along its path. The increased velocity runoff and sediments directly into the river or along the stream crossing causing more erosion.

Nutrients

The addition of nutrients to an aquatic system causes increases in plant growth. Excessive plant growth has a negative impact on fish and aquatic invertebrates. Excessive plant growth can produce dramatic swings in both dissolved oxygen and pH levels that can be harmful or even fatal to other aquatic life. Aquatic systems are most often limited by phosphorus and are therefore impacted by its addition. Nitrogen generally has less of an impact on aquatic plan

growth. However, high nitrate levels in groundwater used as drinking water source can lead to human health concerns.

An increased nitrogen level in drinking water is a known human health risk. Nitrate (NO3) is a form of nitrogen combined with oxygen, which can be converted in the body to nitrite (NO2). Typical sources of nitrate include: sewage disposal systems, run-off from barnyards, or fertilized fields, industrial wastes, or they may be found naturally in the soil. Nitrates in large amounts may bond with hemoglobin in the red blood cells of infants and prevent it from carrying oxygen. This may cause a condition known as methemoglobinemia or "blue baby syndrome." The acutely poisoned person will have a blue discoloration of the skin due to the reduction of the amount of oxygen in the blood stream and must be attended by a physician immediately. Also, because nitrates may be found in sewage or animal waste, excessive levels in drinking water may indicate the presence of other types of potentially harmful contaminants.

Water sample testing needs to be done to determine the amounts nutrients available within the Days River waterways. Based on visual observation only two areas of the Days River appeared to be affected by excess nutrient loading. This is based on increased algae growth. Both areas are suspected to originate from a failing septic system and a sewage lagoon. Based on visual observations there appears to be little if any impact from agricultural sources. Landscaped lawns mowed right up to the streambanks edge contribute to both lawn fertilizer runoff into the stream and a lack of a vegetative buffer along the river. Vegetative buffers serve several purposes. One such purpose is to utilize nutrients before it runs off into the stream and provide root structure within the stream bank reducing soil loss from erosion.

Figure 11 Source of algae, nutrients from suspected failing septic system

Coliform Bacteria

Coliform Bacteria are ranked number three pollutant in the watershed. Bacteria entering streams from leaking septic systems or improperly functioning sewage lagoons can become problematic and are most likely sources of bacteria in the watershed. High levels of human-induced bacteria are a threat to human health and can reduce the recreational value. Animal waste may also contribute to bacteria levels. This is likely the same source as the nutrient inputs.

Increased Temperature and Altered Hydrologic Flow

Increased temperature is ranked number four and altered hydrologic flow is ranked number five pollutants in the watershed. The change in temperature is often a forgotten pollutant. Open canopies, decreased shading, and wider shallower stream channels create more effective solar

radiation absorption and lead to warmer stream temperatures. Culverts and impoundments add to the problem by allowing sediments to drop out of suspension and settle to the bottom. This causes the stream to become shallower and wider, thus increasing the temperature. With limited groundwater inputs increased temperatures can have a negative effect on aquatic wildlife (Taft 1991). Within the watershed temperature changes are attributed to several sources. One source includes a lack of a vegetative buffer, to provide shade to keep temperatures low. Another source is minimal groundwater contributions. Through out the river survey a number of small feeder streams were found with temperatures in the mid 50's, however they were small and not numerous enough to counter act the heat provided by the sun. The average temperature of the main river channel was 65 degrees F with highs of 78 degrees F. In areas where the stream flows across bedrock the river channel was noticeable wider. It's in areas like this that the river is warmed by the sun elevating the rivers overall temperature. Though average temperatures are currently within expectable levels for coldwater fisheries with the loss of vegetative cover and forested buffers to provide shade for the river channel levels can rise above acceptable levels having a negative impact on the fisheries.

Altered river hydrology can be linked to severely pollutants of concern, sources and causes within the watershed. Changes in land use within the watershed can contribute to increased amounts of runoff entering the stream. The amount of runoff and the velocity at which it enters the stream can be affected by a lack of vegetative buffer along the river channel, an increased amount of impermeable surfaces being constructed, and reduced forested areas are just a few examples. Some of the small tributary streams have altered hydrology due to stream channel incision. It is unclear as to what caused the incision of the streams; however the change in hydrologic flow is evident. In times for large rain events high water levels are unable to flood out into the flood zones along the streams edge. This in turn causes higher velocities allowing more sediment to be picked up and banks to be eroded away and deposited into the main river channel.

Invasive Species

Invasive species are ranked number six pollutant of the watershed. Invasive species have become a concern in many if not all ecosystems today; the Days River Watershed is no different. Species suddenly taken to new environments may fail to survive but often they thrive, and become invasive. This process, together with habitat destruction, has been a major cause of extinction of native species throughout the world in the past few hundred years. Although in the past, many of these losses have gone unrecorded. Today, there is an increasing realization of the ecological costs of biological invasion in terms of irretrievable loss of native biodiversity. Invasive, non-native plants are a global problem. In the US alone, non-native plants invade over 1.7 million acres each year. Human activities are primarily responsible for the spread. Invasive plants diminish fish and wildlife populations by displacing the native food and cover plants that these organisms depend on for survival.

Invasive species are organisms (usually transported by humans) which successfully establish themselves in, and then overcome, otherwise intact pre-existing native ecosystems. Most often invasive species will take advantage of disturbed ecosystem. Biologists are still trying to characterize this capability to invade in the hope that incipient invasions can be predicted and stopped. Factors may include: an organism has been relieved of the pressures of predators or

parasites of its native country; being biologically "hardy", for example, has short generations and a generalist diet; arriving in an ecosystem already disturbed by humans or some other factor. But whatever the causes, the consequences of such invasions - including alteration of habitat and disruption of natural ecosystem processes - are often catastrophic for native species (ISSG 2004).

Currently the only invasive species that was noted along the banks of the Days River watershed is Glossy Buckthorn and Spotted Knapweed. It is likely that if you looked further you will likely find others. Buckthorn can be found dominating several of the riparian areas and wetlands within the Days River Watershed. These sites were not mapped however the two major sites were located; along the US 2 and Days River Road corridors, along the North west side of the N.5 road and the Days River. Other locations may found with a more intensive survey. The sites found were large infestations. Spotted knapweed can be found along majority of the roadways in the watershed.

Though no Purple Loosestrife has been found along the banks of the Days River at the time of the survey it has been found in several locations within Delta County. If not stopped soon it is likely that it to will find its way into the watershed. Purple loosestrife has been documented to take over and degrade whole ecosystems.

Road Salt

Fresh water is an important resource and is essential to humans, agriculture, and natural ecosystems. Threats to fresh water have previously been attributed to agricultural practices, climate change, industrial pollution, and overuse. Research has documented increases in salt concentrations in northeastern streams. These increases have been attributed to the application of salt to roads in this region. The salt runs off into watersheds of both rural and urban streams. Rising concentrations of chloride in runoff from roads can have negative impacts on water quality affecting freshwater species and potability of water supplies for human consumption. No chloride concentrations studies were preformed during the inventory so road salt affects within the watershed are only suspected. Due to our winter weather and need for safe driving roads it is likely that chloride concentrations could be on the rise in the watershed. Chloride testing and monitoring should be conducted to determine any impacts.

Navigational Concerns

Log Jams

Logjams are obstructions occurring in streams from the accumulation of whole tree logs, trash, and other floating debris. They obstruct a stream channel, and create a backwater condition. Woody debris within in the stream channel is benefit to many aquatic species. Woody debris contributes to stream habitat diversity by creating pools, side channels, backwaters, and eddies (Hunter 1991). Whole stream logjams do present a problem to navigation when they become large, perpendicular to the river flow, or block the entire width of the river. The Days River is accessible by canoe and kayak with the exception of several logjams that block the entire stream width. The log jams are large enough to cause safety concerns for any paddlers that may encounter them. Log jams discussed here are of navigational concern only. This plan does not advocate removal of woody debris form the river channel. Documents have been provided to

assist in appropriate in-stream woody debris removal (see Appendix E Woody Debris Management). Anyone considering removal of woody debris from the stream should contact the Department of Environmental Quality to obtain the appropriate local, state, and federal permits (see Appendix G Permit Requirements and Contacts).

Critical Areas

Descriptions of Critical Areas

Critical areas are those which now, or in the future, may contribute the greatest amount of pollutants. These areas have been identified to help reduce the geographic scope to the parts of the watershed that are contributing pollutants. The areas identified as a priority area within the Days River consist of; the area classified as coldwater fisheries, between M-35 and south to the mouth of the river, including all of the tributaries, along with two portions of the river with nutrient concerns (see Figure 18 Priority Area). One is just upstream of the M-35 Bridge and the other is Beaver Creek, a tributary between Beaver Lane and St. Nicolas Road. These two priority areas encompass a large majority of the sediment entering the river and where nutrient and pathogen contributions are occurring.

The priority area extends from the bridge on County Road 434 downstream to the mouth of the river. All of the tributaries between these points are included within the critical area. The Beaver Creek tributary is also identified as critical area as well. This tributary is located between St. Nicolas road and Beaver Lane where it empties into the main stream. The portion of the river from Saint Nicolas south to the priority area considered critical area. This is due to the desired use to improve navigation and coldwater fisheries throughout the watershed.

Figure 12 Incised Tributary Channel

Figure 13 Wildlife depend on a health river system for survival (Snapping Turtle)

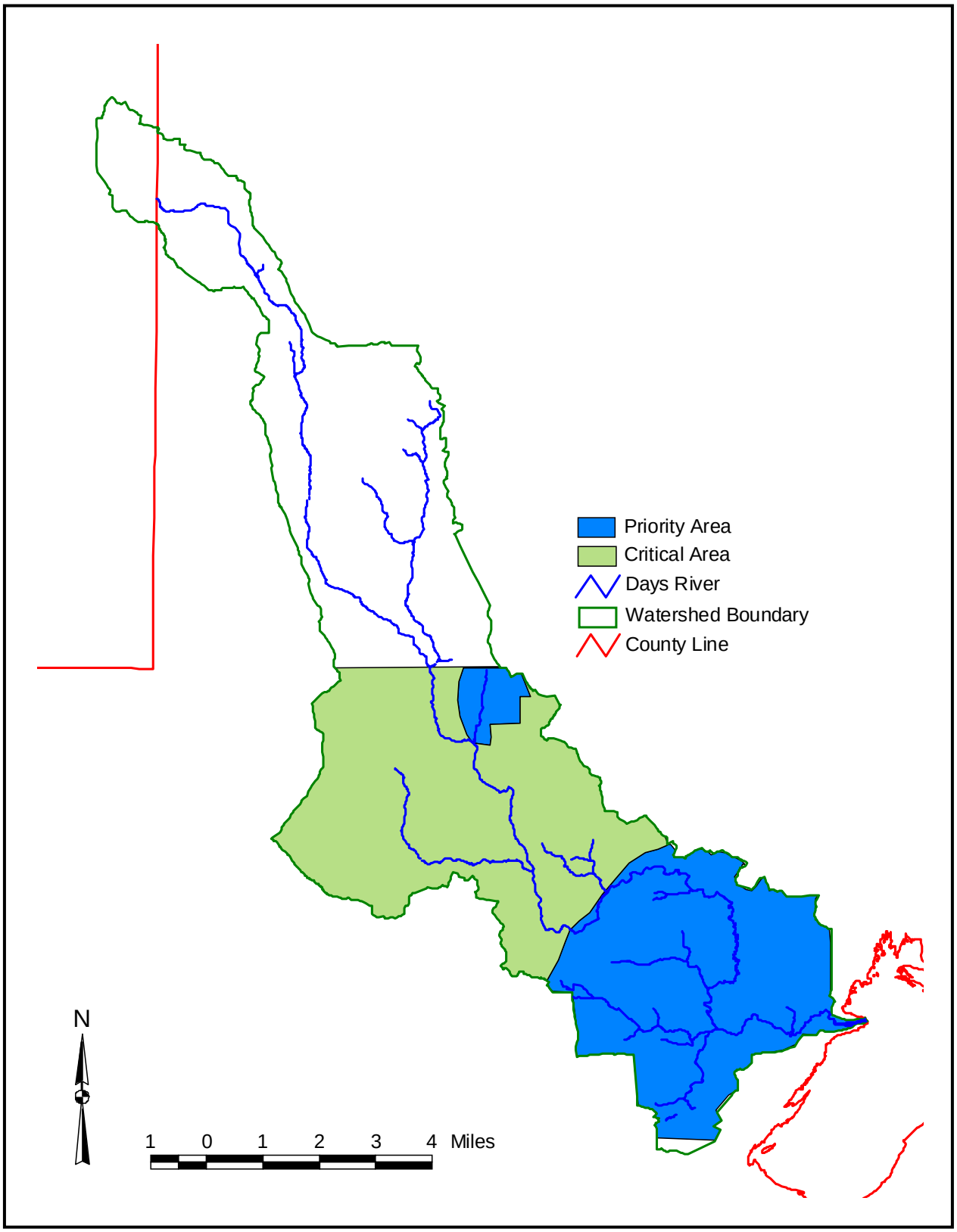
Figure 14 Brook trout in algae choked stretch of river

Figure 15 Streambank erosion near road

Figure 16 Log debris create more than just habitat, debris can be a hazard to paddlers or create more erosion.

Figure 17 Streambank erosion and bedrock river bed

Figure 18 Priority Area



Watershed Inventory

Watershed inventory consists of road stream crossing inventory, windshield survey, canoeing, kayaking, or wading stretches of the river and streams. Aerial photos and GIS digital ortho quads were used to help determine areas of concern that needed further field survey work. The road stream crossing was performed using the *Stream Crossing Watershed Survey Procedure April 27, 2000* (SCWSP) as a guide. The same survey procedure was used during the in-stream survey portion of the inventory. This procedure worked well in keeping all the data collected consistent regardless of location.

Public Participation

During the planning process of the Days River Watershed Project public participation was encouraged and sought after. Before the project began and informational meeting was held to ask for the publics input, regarding what their concerns were with local watersheds. This information was then used to select a watershed and prioritize inventory goals. A watershed steering committee was formed to act as an advisory committee for the watershed project. This committee met bi-annually. The committee included members from several agencies and private landowners. Agency people include US Forest Service - Hydrologist, Natural Resources Conservation Service – Resource Conservationist, Michigan Department of Natural Resources - Fisheries Biologist, Township officials, Gladstone City Manager, County Commissioner, MSU Extension, Mead Westvaco (now New Page), and Delta County Road Commission. Other members included local wildlife groups and private landowners. This committee reviewed the progress of the inventory and made decisions regarding aspects of the watershed to prioritize.

Public comments were also received in the field during field surveys, volunteer work days, and during discussions regarding the watershed project. This information was compiled and utilized in prioritizing watershed activities and areas of concern. Public comments have not been received regarding the completed management plan at this time. Public comment and feed back will still be pursued regarding the completed management plan.

Prioritizing Areas of Concern

In order to identify threatened uses, pollutants, and their potential sources: the Days River Watershed Steering Committee utilized the data collected during the road stream crossing survey and the in-stream survey. Using the identified sites of concern, the steering committee created an overall priority methodology based on the following water quality concerns: degradation of coldwater fisheries habitat, road stream crossings, public education, flashy runoff events, potential impacts on drinking water, partial body and full body contact, effects on Little Bay De Noc, and navigability of the stream (see Table 5 Pollutant Sites).

These concerns were organized into general pollutant categories; sediment, nutrients, bacteria/ pathogens, temperature, altered flow, log jams/debris, and invasive species. Pollutants were taken from Table 2 Designated and Existing Uses (Pollutants are ranked on a hole over the entire watershed. Sources in this table are ranked per Designated Use.) and ranked on a whole watershed basis. This ranking allows us to see which pollutant is having the largest negative impact on the watershed. These categories were ranked against each other to determine priority (see Table 3 Pollutant and sources). The sources are listed per each pollutant and ranked within

each category separately. The same source may show up in another pollutant category with a different ranking. The purpose of this ranking is to determine which source is most likely responsible for the pollutants affecting the watershed. Cause for each source are ranked from highest (1) to lowest (5) within the source category (see Table 4 Sources and causes of pollutants). This ranking is to assist in determining which cause is has a larger contribution to the source of the pollutant.

Table 3 Pollutant and sources

Pollutants and Rankings	Sources	Source Ranking
Sediment k* Rank: 1	Streambank erosion	1
	Lack of vegetative buffer	2
	Road stream crossings	3
Nutrients s+ Rank: 2	Failing septic system	1
	Septic lagoon discharge	2
	Livestock near stream	3
	Lack of vegetative buffer	5
	Lawn fertilizer runoff	4
Bacteria / Pathogens s+ Rank: 3	Failing septic system	1
	Septic lagoon discharge	2
	Livestock near stream	3
Temperature k* Rank: 4	Lack of vegetative buffer	1
	Minimal groundwater contributions	2
	Beaver Dams	4
	Shallow & wider stream channel	3
Altered Flow s+ Rank: 5	Minimal groundwater contributions	3
	Altered riparian areas	1
	Lack of vegetative buffer	2
	Shallow & wider stream channel	4
	Beaver Dams	6
	Incision of stream channels	5
Invasive Species k* Rank: 6	Invasive species	1
Road Salt s+ Rank: 7	Road Stream Crossings	1

*k= Known +s=Suspected

Table 4 Sources and causes of pollutants

Pollutants	Source*	Cause	Rank
Sediment	Streambank erosion	Change in hydrology s+	1
		Human access k*	2
		Road Runoff increased velocity k*	4
		Lack of vegetative buffer k*	3
Sediment, Road Salt	Road stream crossings	Gravel road grading k*	1
		Winter road salt runoff s+	4
		Erosion from/around bridges, culverts, and roads k*	2

Pollutants	Source*	Cause	Rank
		Culvert sizing and placement k*	3
Nutrients, Bacteria & Pathagens	Failing septic system	Poorly maintained, designed, or sited septic systems s+	1
Nutrients, Bacteria & Pathogens	Septic lagoon discharge	Poorly maintained, designed, or sited sewage lagoon systems s+	1
Nutrients, Bacteria & Pathogens	Livestock near stream	Improper manure management practices s+	2
		Inadequate of Buffer Zone k*	1
Sediment, Nutrients, Temperature, Altered Flow	Lack of vegetative buffer	Lawns and grasses areas right up to streambank k*	2
		Sandy soils limiting vegetative options k*	1
		Lack of education on importance of vegetative buffers s+	4
		Invasive Species k*	3
Nutrients	Lawn Fertilizer Runoff	Lack of vegetative buffers k*	1
Temperature	Minimal groundwater contributions	Drought years s+	1
		Loss of Wetlands s+	2
Temperature	Shallow & wider stream channel	Increase sediments k*	1
Altered Flow	Altered riparian areas	Change in land use from natural to residential k*	1
		Invasive species k*	2
		Lack of vegetative buffers k*	3
		Lack of education on importance of vegetative buffers s+	4
Temperature, Altered Flow	Beaver Dams	Beaver activity k*	1
Invasive Species	Invasive species	Human introduction s+	3
		Spread of colonized population s+	1
		Lack of Information and Education to the public s+	4
		No natural predators k*	2

*k= Known +s=Suspected

Road Stream Crossing Survey

The road stream crossing consisted of windshield surveys and completion of the SCWSP at each of the sites. There are a total of 41 road stream crossings within the Days River Watershed. Thirty five of the sites were determined to be of good condition with no erosion issues. Four sites were ranked as fair condition with minor erosion concerns. Two sites ranked with poor condition with major erosion concerns. Aquatic organism passage was a concern on only a few of the culverts.

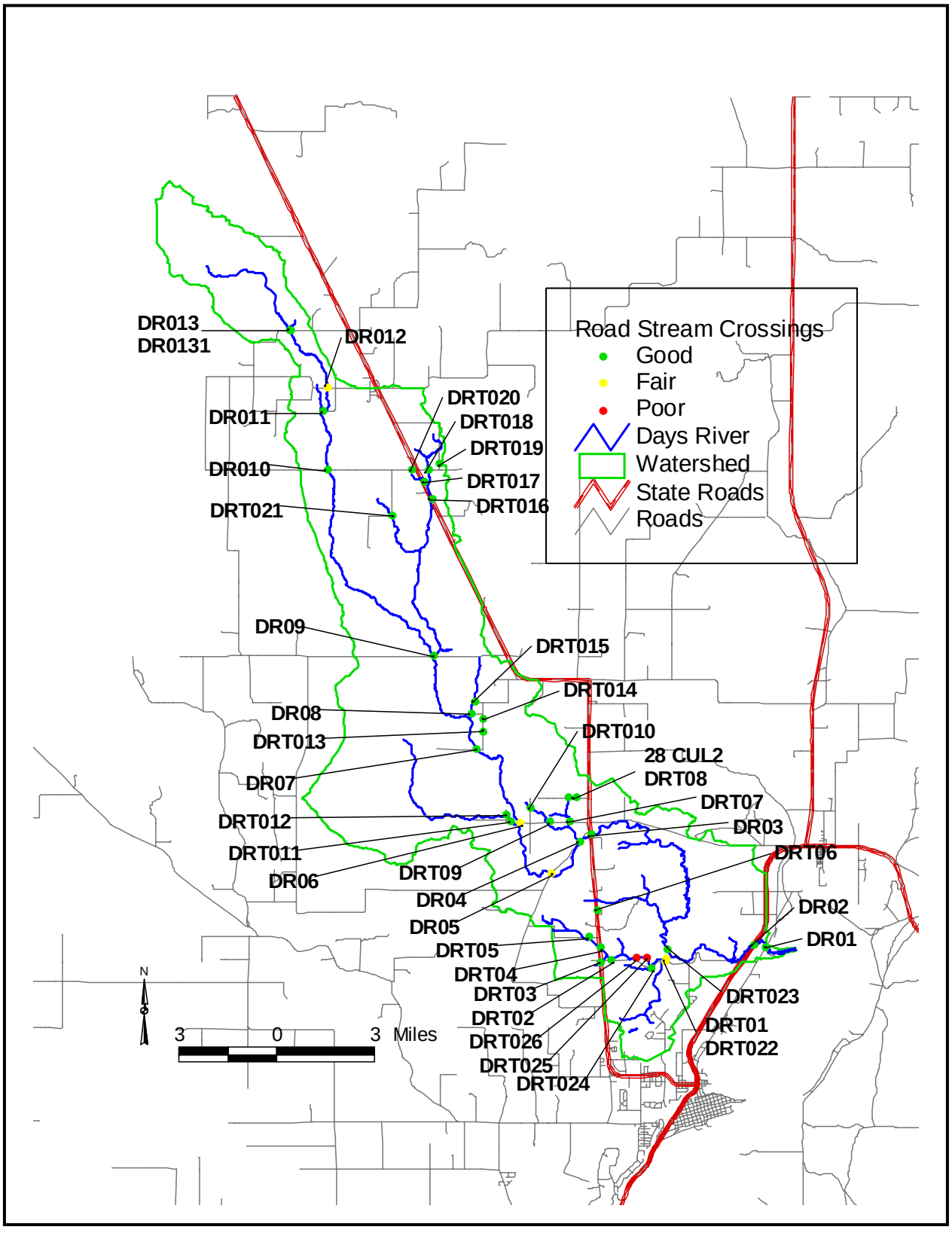
Road stream crossings that were determined to be in fair conditions had small erosion concerns. Site DR012 has no vegetation above the new culverts. Sites DR05 and DR06 have sedimentation from the road entering the river. Site DR022 culvert was determined to be a passage issue due to the plunge pool on the down river side. With the rate of water flow, length of culvert, diameter and plunge pool at the end, the culvert was considered impassable for aquatic species. The culvert at site DR01 was determined to be failing due to the large sink hole behind the culvert collar that is eroding into the culvert (see Figure 21 Road Stream Crossing Summary).

Two of the road stream crossings were considered in poor condition. Both of these crossings belong to the Michigan Department of Natural Resources. They are located within the Days River Pathway Recreational Area. One bridge was a crossing for cross-country skiers and mountain bikers. This bridge has since been removed due to structural concerns, but there are plans for it to be replaced. The second bridge, Mini Mac, is a crossing for the snowmobile trail. Both bridges contribute large amounts of sand to the small tributary. During the stream survey it was determined that the sand sediments ended shortly upstream of the last bridge. A large majority of the sand that is entering the stream is coming from the approach trails.

Figure 19 Kipling road bridge DR01

Figure 20 Trombly road culverts DR10

Figure 21 Road Stream Crossing Summary



Main River and Tributary Survey

Sections of the watershed were visited via canoe, kayak, and by foot. The number of snags, log jams, large woody debris, and low water levels make canoe or kayak access difficult and some times impossible in many portions of the river. About six miles of river were surveyed from a boat during high water levels. During low water levels and in areas with large amounts of debris the river was surveyed by wading upstream. The majority of the lower watershed was surveyed via wading. A total of 126 sites were surveyed using the SCWSP process. During this survey process sites that were determined to be of concern were marked and surveyed. These sites ranged from algae blooms, streambank erosion, trash, dams, and log jams. Sites marked as algae blooms and streambank erosion presented potential water quality concerns. Sites marked as garbage, dams, and log jams were not as much a concern for water quality as to navigation and aesthetic value.

Sites marked as algae blooms are potentially a result of failing septic system and sewage lagoon. Throughout the survey the main stream was clear of large algae blooms except for these two sites. Residents along the Beaver Creek near Mid Pen School north of Perkins have seen changes in the creek since the school sewage lagoon was installed. The loss of fish habitat after the lagoon installation was documented in *A Creek Story* by Charles Dedic.

Within the lower portions of the river, streambank erosion is considered the greatest risk to water quality. Nineteen sites were documented as streambank erosion concerns along with a two mile stretch of river. This two mile stretch of river meanders back and forth through alluvial soils and is considered natural erosion (see Figure 6 Alluvial Soils). The extent of this erosion is amplified due to increased flows needs to be determined by a hydrologic study. The remainder of sites were considered natural and human enhanced or induced. This was determined based on the proximity to human disturbance or activity that would increase the normal runoff volumes.

Figure 22 Stream inventory via canoe

Sites of Concern

Throughout the priority area, sites have been identified that are contributing to the degradation of water quality of the Days River. The sites listed in Table 5 Pollutant Sites are the major pollutant sources identified during the river inventory. The pollutants of concern from each of the sites consist of sediment, nutrient, bacteria, and pathogens. For details about which pollutants are contributors to each site, review Table 5 Pollutant Sites. The number one pollutant identified within the watershed is sediment from eroding streambanks. A change in hydrology may be attributed to each of the sites as well. In increase in runoff waters entering the river system from

and increased number of roads over time, drainage ditches directed into the river, increase amounts of impervious surfaces (roofs, driveways, roads and trails etc.) It is unknown if the Days River system was used to float logs out to lakeshore mills in the logging era, but this could also account for some of the historic changes in the river system. A stream showing a deep incision usually indicates a recent history of increased runoff upstream (Biotechnical). Evidence of stream incision can be seen is several of the rivers smaller tributaries, as was pointed out by a US Forest Service Hydrologists who sat on the watershed committee. In order to determine the extent an in-depth hydrologic study needs to be completed.

Table 5 Pollutant Sites

Location	Source	Cause	Pollutant of Concern	Priority
B ER 1	Streambank Erosion	Diminished vegetated buffer, altered hydrology	Sediment	2
B ER 2	Streambank Erosion	Diminished vegetated buffer, altered hydrology, foot traffic, road runoff, deflection from tree debris, center channel island forming	Sediment	1
B ER 4	Streambank Erosion	Altered hydrology, lack of vegetated buffer runoff, deflection from tree debris	Sediment	1
B ER 7	Streambank Erosion	Altered hydrology, lack of vegetated buffer, runoff, groundwater seeps, soil types, deflection from tree debris	Sediment	1
B ER 9	Streambank Erosion	Altered hydrology	Sediment	2
B ER 10	Streambank Erosion	Altered hydrology, runoff, groundwater seeps, deflection from tree debris, slopes	Sediment	1
B ER 11	Streambank Erosion	Altered hydrology, runoff, groundwater seeps, deflection from tree debris	Sediment	2
B ER 12	Streambank Erosion	Altered hydrology, runoff, slope, deflection from tree debris	Sediment	2
B ER 13	Streambank Erosion	Altered hydrology, runoff, slope, deflection from tree debris	Sediment	2
B ER 14	Streambank Erosion	Altered hydrology, runoff, slope, deflection from tree debris	Sediment	2
B ER 15	Streambank Erosion	Altered hydrology	Sediment	3
B ER 16	Streambank Erosion	Altered hydrology, deflection from tree debris	Sediment	2
B ER 17	Streambank Erosion	Altered hydrology, slope, deflection from tree debris	Sediment	2
B ER 18	Streambank Erosion	Altered hydrology, runoff, slope, deflection from tree debris lack of vegetated buffer	Sediment	1

Location	Source	Cause	Pollutant of Concern	Priority
B ER 19	Streambank Erosion	Altered hydrology, slope	Sediment	2
B ER 20	Streambank Erosion	Altered hydrology, runoff, slope, deflection from tree debris, lack of vegetative buffer	Sediment	2
B ER 21	Streambank Erosion	Altered hydrology, runoff, slope, deflection from tree debris, foot traffic, lack of vegetative buffer	Sediment	2
ORV 1	Streambank Erosion, ORV Traffic	Runoff, groundwater seeps, ORV traffic	Sediment	1
Septic 1	Failing Septic*	Failing Septic System from residents	Nutrient, Bacteria, Pathogens	1
Septic 2	Sewage Lagoon*	Septic Lagoon Discharge	Nutrient, Bacteria, Pathogens	1
RSC DR05	Road Stream Crossing	Erosion from / around bridge, grade of road	Sediment	2
RSC DRT01	Road Stream Crossing	Failing culvert	Sediment	1
RSC DRT022	Road Stream Crossing	Improper culvert sizing and placement	Sediment	1
RSC DRT025	Road Stream Crossing	Erosion From Bridge, Trail approach graded toward bridge	Sediment	1
RSC DRT026	Road Stream Crossing	Erosion From Bridge, Trail approach graded toward bridge	Sediment	1

*Suspected

Figure 23 Streambank erosion caused by wood debris and lack of vegetation B ER 17

Table 6 Estimated Load Reductions

Site #	Linear (ft)	Height (ft)	LRR (ft/yr)	Soil Weight (Ton/ft^3)	Annual Average Sediment Reduction (Tons/yr)
B ER 1	100	6	4	.055	132
B ER 2	100	6	6	.055	198
B ER 4	100	6	4	.055	132
B ER 7	350	10	11	.055	2117.5
B ER 9	16	8	4	.055	28.16
B ER 10	120	75	30	.055	14850
B ER 11	100	12	8	.055	528
B ER 12	100	15	8	.055	660
B ER 13	300	10	6	.055	990
B ER 14	18	6	6	.055	35.64
B ER 15	60	6	6	.055	118.8
B ER 16	100	4	6	.055	132
B ER 17	20	5	8	.055	44
B ER 18	40	5	5	.055	55
B ER 19	100	25	4	.055	550
B ER 20	200	5	4	.055	220
B ER 21	100	5	8	.055	220
ORV 1	60	20	45	.055	2970
Bacteria/Nutrients	Existing Levels		Target Concentration Levels		Target concentrations
Septic 1 & 2	No testing completed at the time plan was written. Baseline testing should be completed before any work is begun to repair problems.		Load levels should be lower than EPA recommended water quality criteria levels. This is for both bacteria and nutrients levels. Nutrients -- $N0_3$: oligotrophic < .3 Mg/l or mesotrophic < .3-.5 mg/l P: oligotrophic < 10ug/l Mesotrophic < 10-30 ug/l Bacteria -- GM 130cfu/100ml SM 300 cfu/100ml		Nutrients – $N0_3$: oligotrophic < .3 Mg/l or mesotrophic < .3-.5 mg/l P: oligotrophic < 10 ug/l Mesotrophic < 10-30 ug/l Bacteria -- 25% below GM 130cfu/100ml SM 300 cfu/100ml
Temperature	Existing Temps		Desired Temps		
Main River Channel	Summer temperatures were observed around 78 degrees		Surface water must stay below 72 degrees in the summer and sustain temperatures below 65 degrees at greater depths.		Eliminate incidences above 72 degrees.
Hydrology	Existing Levels		Desired Levels		
Watershed	Peek discharge of 550 cfs at point 3 for a two year storm event is higher than downstream estimates of 500 cfs at point 2 (figure 8 & table 1)		Stabilized stream flow though out priority area of the watershed		500 cfs at point 3.

Figure 24 Streambank site B ER 7

Figure 25 New erosion since inventory across from B ER 7

Figure 26 Whole Stream Log Jam and Resulting Bank Erosion

Figure 27 Groundwater Spring Stream

Figure 28 Areas of Concern, Streambank Erosion

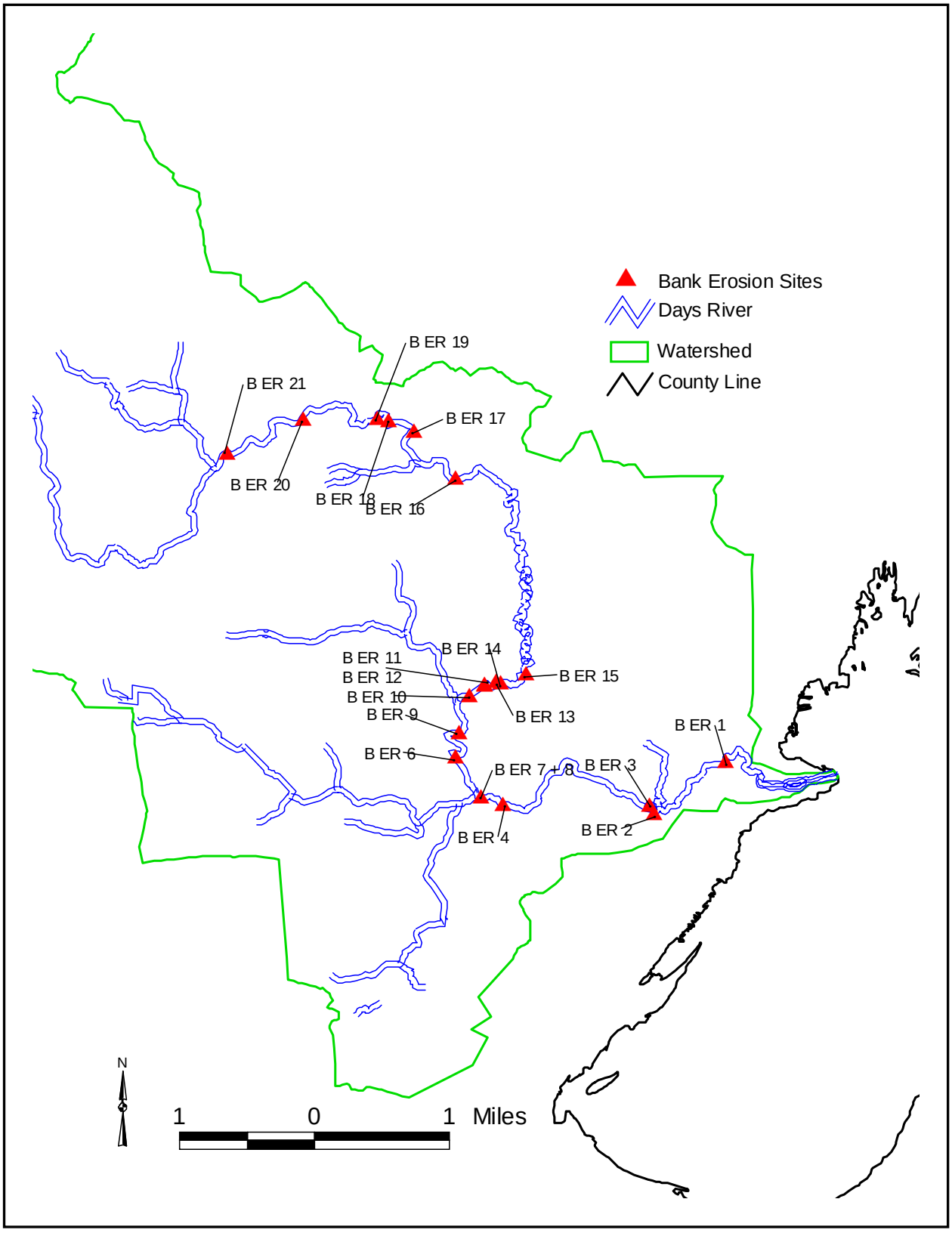
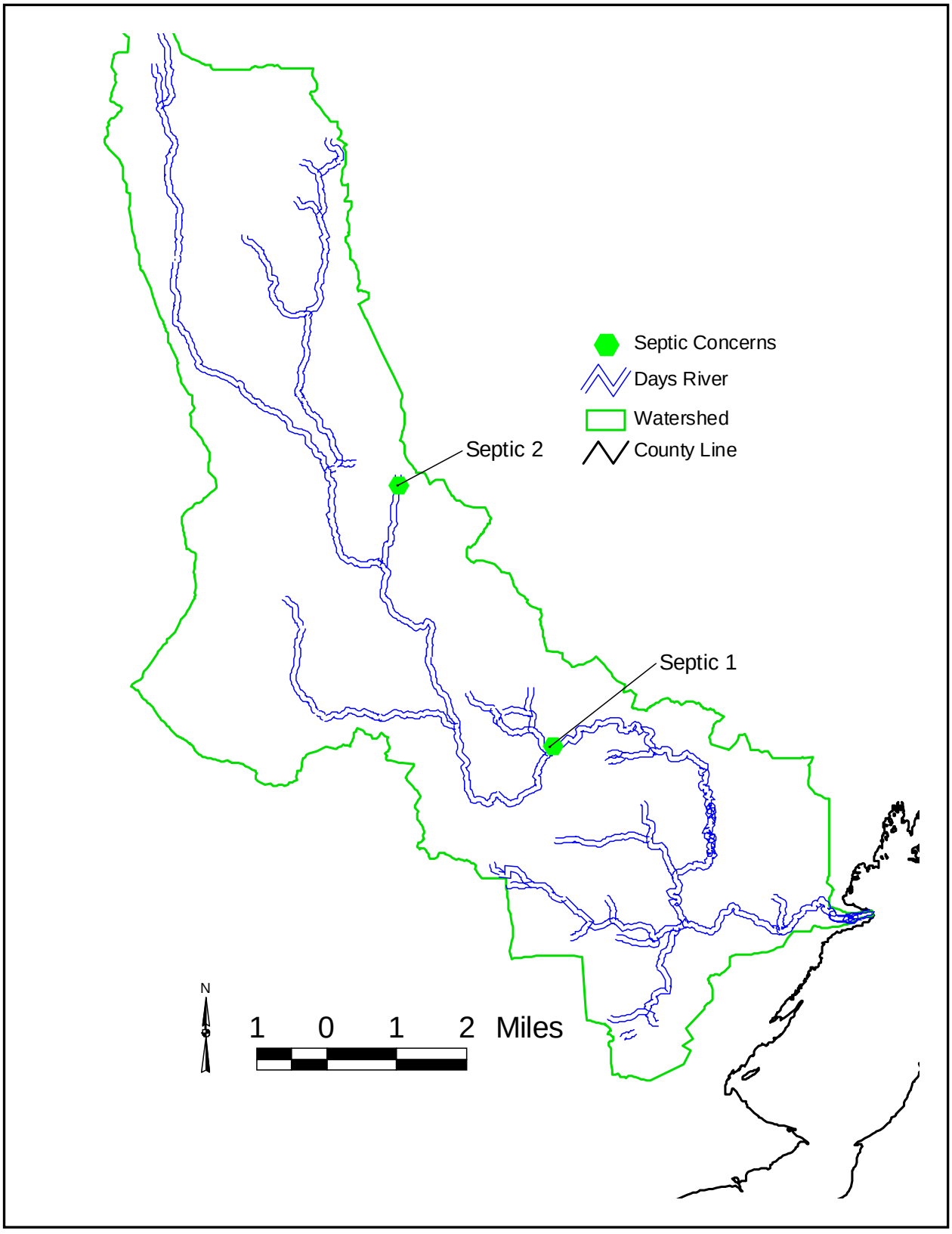


Figure 29 Areas of Concern, Failing Septic System



Watershed Goals and Objectives

A variety of goals and objectives for the Days River Watershed have been identified through meeting with stakeholders and the steering committee. Some of the objectives will accomplish more than one goal. For example, stabilizing priority streambank erosion sites will help achieve Goals A and B. The watershed management goals and objectives are identified in Table 7 Goals and Objectives. Each of the objectives has been outlined separately below to better describe the management measures that will need to be implemented to achieve the desired reduction in pollutants.

Table 7 Goals and Objectives

Goals	Objectives
A. Improve the warm water and coldwater fisheries and improve habitat for other indigenous aquatic life and wildlife in the watershed by reducing the amount of nutrients, sediment, and other pollutants entering the system.	1. Stabilize priority streambank erosion sites through the installation of best management practices.
	2. Improve road stream crossings to reduce the amount of sediment and other pollutants entering the river.
	3. Establish green belts / conservation buffers at sites in critical areas.
	4. Identify and improve failing septic systems.
B. Improve the hydrology and morphology of the river	1. Restore wetlands to replace those that have been lost.
	2. Restore tributaries to decrease incision.
C. Improve the navigability of the Days River for canoes, kayaks, and other self-propelled watercraft, by reducing sedimentation and reducing excess woody debris.	1. Remove or cut through downed trees that inhibit navigation and increase bank erosion. This needs to be done in a manor that will benefit not harm the local fisheries.
	2. Stabilize priority streambank erosion sites through the installation of best management practices.
	3. Improve road stream crossings to reduce the amount of sediment and other pollutants entering the river.
D. Enhance recreational access sites to prevent the degradation of water quality.	1. Establish improved boat access and fishing access sites.
	2. Provide educational signs at access sites that educate people about the watershed, good river etiquette, and post signage identifying the water trail
E. Increase knowledge and understanding of water quality within the Days River Watershed	1. Perform water quality monitoring to determine the existing quality of the river as well as to monitor changes over time.
	2. Continue to monitor streambank erosion with bank pins.
F. Prevent the introduction and spread of invasive species throughout the management area.	1. Establish invasive species control programs to prevent the spread of exotic invasive species.

Table 8 Objectives defined

Goal A: Improve the warm water and coldwater fisheries and improve habitat for other indigenous aquatic life and wildlife in the watershed by reducing the amount of nutrients, sediment, and other pollutants entering the system. Timelines for each objective are discussed as Short-term = 1to 3 years, Mid-term = 3 to 7 years, and Long-term = 7 to 15 years.

Objective 1	Stabilize priority streambank erosion sites through the installation of best management practices.
Tasks	A. Obtain engineered designs using best management practices appropriate to stabilize banks B. Pursue funding locally and through available grant sources C. Ensure that necessary permits and permissions are acquired D. Coordinate streambank stabilization efforts
Milestones	1984 linear feet of streambank stabilized, Complete 50% of sites by year 5
Timeline	Short-term
Priority	High
Location and size or area	Designated critical area (See Figure 18 Priority Area)
Pollutants Reduced	Sediment, nutrients
Coordination agencies	Conservation District, landowners, and property managers
Evaluation	Before and after bank pin erosion study, reduced period between dredging of sediment trap, improved fish spawning habitat
Project site Numbers	BER1, BER2, BER4, BER7, BER9, BER10, BER11, BER12, BER13, BER14, BER15, BER16, BER17, BER18, BER19, BER20, BER21
Cost	$80 /ft. tree revetment 11 sites, 1174ft. @ $80 = $93920 $120 /ft. rip rap or crib wall 6 sites, 910 ft. @ $120 = $109,200

Objective 2	Improve road stream crossings to reduce the amount of sediment and other pollutants entering the river.
Tasks	A. Work with County Road Commission and other stream crossing owners or mangers to identify road stream crossing issues B. Implement Best Management Practices to reduce the amount of pollutants entering the river
Milestones	Reduces pollutants entering the river from crossings. Replaced failing culverts or culverts that present an aquatic species passage issue, Replace 75% of failing culverts by year 5.
Timeline	Mid-term
Priority	High
Location and size or area	Designated Critical area (See Figure 18 Priority Area)
Pollutants Reduced	Sediments, Salts, Oils, and other chemical pollutants
Coordination agencies	County Road Commission, Stream Crossing Manager or Owner
Evaluation	Visual Survey, before and after photo documentation, reduced period between dredging of sediment trap, improved fish spawning

Objective 2	Improve road stream crossings to reduce the amount of sediment and other pollutants entering the river.
	habitat
Project site Numbers	RSC DRT01, RSC DRT022, RSC DRT025, RSC DRT026,
Cost	Estimated Cost $45,000

Objective 3	Establish green belts / conservation buffers at sites in critical areas.
Tasks	A. Work with riparian landowners
Milestones	200 Linear feet of greenbelts or buffers installed or maintained each year
Timeline	Mid-term, Establish 1000 ft of greenbelts and vegetative buffers by year 5.
Priority	Medium
Location and size or area	Designated Critical area (see Figure 18 Priority Area)
Pollutants Reduced	Sediment, nutrients, temperature, chemical pollutants
Coordination agencies	Conservation District, Landowner
Evaluation	Linear feet of greenbelts or buffers installed or maintained
Cost	Estimated Cost $25,000

Objective 4	Identify and improve failing septic systems
Tasks	A. Work with local health department, DEQ, and landowners to identify failing septic systems B. Facilitate septic system inspections
Milestones	Replacement of failing septic systems, Replace failing septic system by year 3, begin work on failing lagoon by year 5.
Timeline	Mid-Term
Priority	High
Location and size or area	Designated Critical area (see Figure 18 Priority Area)
Pollutants Reduced	Nutrients, Pathogens, and Bacteria
Coordination agencies	Health Department, DEQ, Conservation District
Evaluation	Water Quality Monitoring
Project site Numbers	Septic 1, Septic 2
Cost	Estimated Cost $40,000

Goal B: Improve the hydrology and morphology of the river

Objective 1	Restore wetlands to replace those that have been lost.
Tasks	A. Locate landowners interested in recreating wetlands on their properties B. Locate funding for wetland restoration projects C. Work with available programs to create viable wetland restoration projects
Milestones	Acres of wetlands restored or recreated, All prior converted

Objective 1	Restore wetlands to replace those that have been lost.
	wetlands inventoried by year 3, 2 landowners begin working with WRP program by year 5
Timeline	Short to Long-Term
Priority	Medium
Location and size or area	Within the entire watershed
Pollutants Reduced	Sediment, nutrients
Coordination agencies	Funding source, Conservation District
Evaluation	Acres of viable wetlands restored or created
Cost	Estimated Cost $25,000

Objective 2	Restore river channel and flow to decrease incision
Tasks	A. Stream Morphology Studies B. Work with riparian landowners to locate appropriate stretches for restoration C. Obtain properly engineered viable plans to decrease incision on streams
Milestones	2 Impaired sections of stream restored to natural flow patterns by year 2
Timeline	Long-Term, Begin volunteer monitoring by year 2.
Priority	Medium
Location and size or area	Entire Watershed
Pollutants Reduced	Sediments
Coordination agencies	DEQ, Engineering Agency, DNR, Conservation District, Landowner
Evaluation	River morphology studies
Project Site Number	Affected Tributaries draining into the Days River
Cost	Estimated Cost $35,000

Goal C: Improve the navigability of the Days River for canoes, kayaks, and other self-propelled watercraft, by reducing sedimentation and reducing excess woody debris.

Objective 1	Remove or cut through downed trees that inhibit navigation by and increase bank erosion.
Tasks	A. Locate snags that are impassable by canoe or kayak, and causing streambank erosion B. Train volunteer on proper methodology for removing identified snags in a manor that will benefit local fisheries C. Contact riparian landowners
Milestones	At least 20 miles navigable by paddle craft by year 3
Timeline	Short-term
Priority	Medium

Objective 1	Remove or cut through downed trees that inhibit navigation by and increase bank erosion.
Location and size or area	Designated Critical area (See Figure 18 Priority Area) and middle portion of the river system
Pollutants Reduced	Trash, debris, sediment
Coordination agencies	Conservation District, Local Paddlers, Volunteers
Evaluation	Document river miles made accessible to canoe and kayak.
Cost	Estimated Cost $5,000

Objective 2	Stabilize priority streambank erosion sites through the installation of best management practices. (See Goal A)

Objective 3	Improve road stream crossings to reduce the amount of sediment and other pollutants entering the river (See Goal A).

Goal D: Enhance recreational access sites to prevent the degradation of water quality.

Objective 1	Establish improved boat access and fishing access sites.
Tasks	A. Work with local governments and agencies to locate potential access sites, and improve existing access sites B. Assist in design of access sites to minimize river sedimentation
Milestones	Improved river access, Identify, 4 potential access sites by year 3, begin planning for sites by year 6.
Timeline	Long-term
Priority	Low
Location and size or area	Designated Critical area (see Figure 18 Priority Area) and middle portion of the river system
Pollutants Reduced	Sediment
Coordination agencies	Conservation District, Local Paddlers, Local Fisherman
Evaluation	Improved river access
Cost	Estimated Cost $20,000

Objective 2	Provide educational signs at launch sites that educate people about the watershed and proper river etiquette, post signage identifying the water trail.
Tasks	A. Locate sites for signs and obtain permission to install signs. B. Develop information for signs
Milestones	Signs installed and maintained along designated water trail by year 3
Timeline	Long-term, Provide signage along current access sites by year 3. Include signs with Objective 1 above.
Priority	Low

Objective 2	Provide educational signs at launch sites that educate people about the watershed and proper river etiquette, post signage identifying the water trail.
Location and size or area	Designated Critical area (see Figure 18 Priority Area) and middle portion of the river system
Pollutants Reduced	All through education of users
Coordination agencies	Conservation District, Local Paddlers, Local Fisherman
Evaluation	Better educated river users. Survey paddlers
Cost	Estimated Cost $5,000

Goal E: Increase knowledge and understanding of water quality within the Days River Watershed.

Objective 1	Perform water quality monitoring to determine the existing quality of the river as well as to monitor changes over time.
Tasks	A. Update and maintain road stream crossing inventory B. Update and maintain erosion studies C. Macroinvertebrate surveys D. Stream morphology studies
Milestones	Completed morphology studies, maintained road stream crossing inventory, erosion studies, and Macroinvertebrate surveys by year 2.
Timeline	Short to Long-term, Begin volunteer monitoring program by year 1.
Priority	Medium
Location and size or area	Designated Critical area (see Figure 18 Priority Area)
Pollutants Reduced	N/A
Coordination agencies	Conservation District, MDEQ, MDNR
Evaluation	Completed morphology studies, maintained road stream crossing inventory, erosion studies, and Macroinvertebrate surveys
Cost	Estimated Cost $5,000

Objective 2	Continue to monitoring streambank erosion with bank pins.
Tasks	A. Installation of bank pins at streambank erosion sites. B. Pin inspection after large runoff events
Milestones	25 Bank pins installed year 1, data collected annually
Timeline	Short to Long-term, Begin volunteer monitoring program by year 2.
Priority	Medium
Location and size or area	Designated Critical area (see Figure 18 Priority Area)
Pollutants Reduced	N/A
Coordination agencies	Conservation District, MDEQ, MDNR
Evaluation	Base line data recorded over period of time
Cost	Estimated Cost $5,000

Goal F: Prevent the introduction and spread of invasive species throughout management area.

Objective 1	Establish invasive spices control programs to prevent the spread of exotic invasive species.
Tasks	A. Identify existing invasive species control programs. B. Work with coordinating agencies to develop or support invasive species control programs C. Information and Education regarding reducing the transport and spread of invasive species.
Milestones	No invasive species within the watershed, begin volunteer monitoring program by year 2, hold 2 demo/ tours by year 4.
Timeline	Short to Long-term
Priority	Medium
Location and size or area	Entire watershed
Pollutants Reduced	Invasive species
Coordination agencies	Conservation District, MDNR, US Fish and Wildlife Service
Evaluation	Number and amount of invasive species being controlled
Project areas	US2 & Days River Road Corridors, NW N.5 Road & Days River, Other sites when identified.
Cost	Estimated Cost $25,000

Action Plan

The premise behind this watershed project is to protect the existing water quality of the Days River and its tributaries, and to identify and improve those areas that are affecting water quality in a negative way. Once the sources of these pollutants have been identified, action needs to be taken to correct the cause of the pollution. It can be discouraging to consider that human actions can be the primary sources of environmental degradation within the Days River Watershed. Fortunately, our involvement can also be the starting point for positive change that results in the protection of the integrity of the watershed. In order to influence this change, the commitment from a variety of involved parties is essential. These participants include local government, community leaders, city and township planners, contractors, business owners, landowners, and local residents. This section focuses on several management strategies participants can use to address many of the issues described in the pollutants of concern as well as a watershed protection goal for each recommendation.

Septic Systems

Septic systems may contribute a great deal of nutrient pollution to our surface waters. Due to the rural nature of the watershed it is likely that all residents of the watershed utilize septic systems. However, it is difficult to determine how much pollution septic systems may contribute to the watershed, or how many septic systems may be failing without extensive testing. Therefore, it is recommended that septic systems be inspected every three to five years and pumped regularly. Working with existing programs such as the Groundwater Stewardship Program's Home*A*Syst program can aid in educating landowners about the importance of regular septic system maintenance. Some municipalities have, or are considering, ordinances that require septic systems to be inspected periodically (e.g. when a home is sold). This is a good start to insuring septic systems are in good working order but this does not address long time homes. The best

solution to this problem is education. Two sites were identified during the stream inventory that are most likely failing septic systems (See Figure 29 Areas of Concern, Failing Septic System). Other sites may exist; however, no evidence was identified during the stream inventory.

Vegetated Buffers

It is recommended that efforts be made to maintain or restore forests along waterways in the Days River Watershed (See Figure 10 Watershed Land Use). Forests dominated the land cover of the watershed prior to European settlement, where much of the river corridor remains in a forested, natural state. Though it now has roads, trails, homes, a golf course and other man made features through out it. This corridor serves to protect and improve water quality by filtering out pollutants, stabilizing streambanks, and providing habitat for a variety of species. A forested corridor keeps river temperatures cool, which benefits the fishery. Natural debris that fall into the river from overhanging trees provides food and habitat for aquatic organisms. Forest buffers help prevent nonpoint source pollution from reaching waterways. Forested streams are more capable of handling the pollutants that do reach them compared to deforested streams (Sweeney et al. 2004). Deforested stream corridors often have increased temperatures and less beneficial woody debris (Sweeney et al. 2004). This forested corridor and vegetative buffers are key features in protecting the water quality on the Days River. Another importance ecosystem in protecting and restoring the hydrology of the river system is wetlands. Wetlands act as a water sink during periods of high runoff. Wetlands allow runoff water to inter the river system at a slower more gradual rate. This reduces the flashy runoff causing elevated water levels and increase stream velocity, which causes incision in many of the tributaries. In order to preserve and properly manage the remaining riparian corridors, wetland areas, and vegetative buffers conservation easement programs should be established to aid landowners in protecting their riparian areas. A 5 year goal is to install 1000 linear feet of buffer strip along the river. Programs to consider for aiding landowners are; Wildlife Habitat Incentive Program, Conservation Reserve Program, Environmental Quality Incentives Program, Wetland Reserve Program, Forest Land Enhancement Program and other available programs. As programs change on a regular basis it is important to determine what program are available and their usefulness in protecting forest corridors and vegetative buffers.

Invasive Species

Invasive species are becoming a growing problem in our environment every day. Within the Days River Watershed the problem is still at a manageable level. That is if it is controlled now and not given further chance to spread. Landowners need to become aware of the issues related to invasive spices. This can be accomplished by teaching landowners to identify invasive species. Once landowners become aware of which plants are invasive they should begin to remove them from their property and replace them with native plants. Ways of accomplishing this include, field days / tours to show landowners ecosystems taken over by invasive species and undisturbed ecosystems. Holding an invasive species removal day can be used to educate landowners to effective methods for removing invasive species. Some conservation programs mentioned above can also be utilized to remove invasive species. Slow the spread programs should be developed to further educate landowners of ways they can reduce the spread of invasive species.

Many agencies are already making efforts to educate and assist landowners in removing native plants from their property. Collaborating such efforts will aid in the battle against invasive species. Other non-native species have been introduce that prey on invasive species, however this may be an option it is not the recommendation of this management plant to promote the introduction of more non-native species into our environment.

Log Jams

As stated before, logs and woody debris in the river are a benefit to local fisheries. Without such debris in the waterways fish habitat would be negatively impacted. This management plan in no way recommends the removal of all wood debris for the benefit of navigation. What is recommended is the management of woody debris in a manor that will benefit both, navigation by paddle craft and local fisheries. Examples of woody debris that would be recommended to remove are logs that direct the main stream flow into a highly erodeable bank. Site B ER 14 for example should not be completely removed due to the habitat benefits; however removal of the northern most portion of the debris would open the main flow of the channel and reduce the stream bank erosion. Site B ER 17 is an example where on small log could be removed or repositioned in a manor that does not direct the flow back into the sandy bank. There are a few sites where the log jams are completely blocking the stream channel. In these areas a "clean and open" method can be used to open the stream channel for navigation (WDMAC) and still leave beneficial woody debris for local fisheries. For more information regarding proper methods for handling woody debris in the river channel refer to Appendix E Woody Debris Management).

Public Access Sites

The Days River is a popular fishing river for many of the local residents and it's a good paddling river during early spring or when water levels are higher. There are currently no access points on the river. Fisherman and paddlers currently use the banks to get down to the river. In areas of sandy or gravel soils this can increase erosion along the bank. To reduce the risk of erosion due to foot traffic for river access, river access points should be installed along the river in key locations. Access points should be located in areas of heavy use to insure they would be utilized. This will aid in reducing risk of bank erosion in areas of high foot traffic. Information and education signs should be installed at these sites to aid in educating the public utilizing the watershed for recreational uses.

Information and Education

Involving the public in the protection of the watershed through education and voluntary stewardship maintains the integrity or our local streams and reinforces their connection with the natural resources and the watershed. Public participation is extremely important in the protection of the watershed. Since the majority of behavioral changes need to protect the watershed will be voluntary actions from the public. An informational/education program should be established to help educate newcomers and existing residents to the watershed. This program would educate residents on such things as riparian buffers, storm water management, septic systems, invasive species, vegetative buffers, etc.

Many landowners are becoming a part of the "urban splatter" trend. They are moving out of the city and moving into the country. One of the biggest adjustments to these landowners is no

longer having municipal sewer and water. They become responsible for proper septic and well maintenance. For some this becomes an out of site out of mind situation until they find themselves with a failing septic system, by this point if they are along the river or one of its tributaries bacteria and nutrient pollutants have already made their way into the river system. One educational tool, that has already been developed and is successful, is Home*A*Syst through the local groundwater programs. The Home*A*Syst help landowners learn about septic and well maintenance along with other areas they can protect water resources around them. This would also encourage buy-in to the Days River Watershed project. Some of the "urban splatter" ends up along rivers and lakes. One of the first things they want to do is clear all vegetation between the house and the river. Many landowners are unaware of the negative impacts this has on the environment they have just moved into. Efforts need to be made to educate landowners in riparian zones and living along lakes and wetlands to the importance of vegetative buffers for wildlife, erosion protection, thermo shading, and many of the other benefits.

A watershed education program should be established within the local schools. This program would focus on educating students about watersheds and water quality protection. Students can be involved in creating a baseline monitoring program, completing monitoring test, GIS mapping, best management practice evaluation, and other water quality aspects of the project.

Many landowners are unaware of the effects that invasive species can have on our environment. An education program should be developed to increase their awareness of what invasive species are and how they are affecting ecosystems and our environment. Collaborative efforts should be made with other agencies and interest groups that are working to educate landowners about invasive species such as; the US Forest Service, Michigan Department of Natural Resources, Natural Resources Conservation Services, Wild Ones. By working together to promote a unified effort a larger rate of success will be achieved.

The waters of the Days River Watershed are protected under several state regulations. The Natural Resources and Environmental Protection Act; Act 451 of the Public Acts of 1994, as amended has many parts that protect the waters of the watershed. These laws are administered by the Michigan Department of Environmental Quality. The Soil Erosion and Sedimentation Control Program is handled in Delta County by the Building and Zoning Department. The Health codes of Delta County offer some protection under the Superior Environmental Health Codes as defined by Section 2441 of Michigan Public Health Code, Act 368, Public Act of 1978. The code is enforced by Delta Menominee Public Health. The public health permitting system regulates septic systems and wells within the watershed. Establishing local ordinances to protect vegetative buffers through out the watershed and set minimum distance, of 100 feet, landowners are allowed to build home next to the river. This ordinance should also provide for a minimum 20 foot vegetative buffer along the rivers edge. To properly protect the Days river watershed such ordinance should be set in Gladstone, and Escanaba, Brampton, Baldwin, and Maple Ridge Townships. A good model to follow is the Riparian Buffer Implementation Plan developed by the Central Lake Superior Watershed Partnership and the Marquette Conservation District (See Appendix H Riparian Buffer Implementation Plan. Landowner wishing to perform any type of construction work within; the river channel, blow the ordinary high water mark, a wetland, 500 feet of a lake or stream, the floodplain, or sand dunes and other protected area will be required to obtain a permit from the Michigan Department of Environmental Quality (MDEQ). Permits can

be obtained from the MDEQ office in Crystal Falls, 906-875-2071. (See Appendix G Permit Requirements and Contacts)

As mentioned earlier in this management plan woody debris is a delicate issue. Woody debris in the river channel is good for aquatic species habitat. The wood debris discussed in this management plan refers to log jams blocking the width of the stream channel. This woody debris posses a safety concern to paddle craft users. Due to the benefits woody debris provides to aquatic species it is vital to educate paddle users, volunteers, and landowner to the importance of proper woody debris management (see Appendix E Woody Debris Management).

Wetland Protection

Every effort should be made to protect the wetland areas in the watershed. In addition, any effort to create additional wetland acreage should be encouraged. Wetlands provide a wide variety of benefits, from filtering pollutants to mitigating flooding effects. Wetlands act as a water sink during periods of high runoff. Wetlands allow runoff water to inter the river system at a slower more gradual rate. This reduces the flashy runoff causing elevated water levels and increase stream velocity, which causes incision in many of the tributaries. The headwaters of the Days River and many of its tributary's begin in wetlands (See Figure 10 Watershed Land Use). The largest obstacle in protecting wetlands is public perception. It is important to education landowners and policy makers to the importance of wetland. This can be accomplished through a variety of tools including, field tours, demo sites, and newsletters. A lot of effort will need to go into changing the current "public view" of wetlands. Programs such as the Wetland Reserve Program should be utilized where applicable to cover prior converted wetlands.

Stream Monitoring

In order to follow the health of the watershed, a thorough inventory of resources and periodic monitoring of local waterways should be undertaken. Although an inventory has been done on portions of the watershed, it is necessary to compile continuing baseline database from which future progress can be measured. The method used to collect existing baseline data is the Steam Crossing Watershed Survey Procedure April 27, 2000 (SCWSP). SWQAS Procedure #51 Survey Protocols for Wadable Rivers (formerly known as the GLEAS Procedure #51) as defined by the Michigan Department of Environmental Quality Surface Water Quality Division (Schneider 2000) can and should be incorporated into the new data collected. This protocol involves the measurement of biological and habitat indicators that result in a rating of the relative health of a stream system. The survey consists of three parts; evaluation of the macroinvertebrate community, evaluation of the fish community, and evaluation of habitat quality. (Schneider 2000). SCWSP should continue to be used for monitoring to aid in comparison of original baseline data. Stream bank erosion sites can be monitored, with the use of bank pins, to determine if stabilization practices have been effective. Pins should be installed at each of the stream bank erosion sites. Including landowners and local classrooms with the steam monitoring builds ownership for residents living in and using the watershed. This is vital to the success of the watershed project. Monitoring methods are listed in Table 9 Monitoring Criteria as well as who will complete portions of the monitoring. Monitoring should be conducted annually as a minimal. Some sites or activities may require more frequent monitoring such as bank pins, temperature, and hydrologic flow measurements.

Table 9 Monitoring Criteria

Item to be monitored	Baseline Data	Desired Levels	Monitoring Methods	Monitoring preformed by:	Cooperating agency (s):*
Stream Bank Erosion	18 Existing Sites identified in Table 5	3 sites restored annually 50 % load reduction achieved by year 3 See Table 6 Estimated Load Reductions	Bank Erosion Pins measured quarterly to determine bank erosion rates. Installed stream bank protection practices.	Watershed Coordinator, Volunteers	MDNR, USFS, NRCS, CD
Nutrients	-Estimates P1610 lbs/yr N6442 lbs/yr -Sample before work beings upstream and downstream of site	Nutrients – $N0_3$: oligotrophic < .3 Mg/l or mesotrophic < .3-.5 mg/l P: oligotrophic < 10 ug/l Mesotrophic < 10-30 ug/l	Water sampling before and after system replacement upstream and down stream of site.	Watershed Coordinator	CD, PH
Coliform Bacteria	-Estimates positive test for e-coli bacteria Sampled before work beings	Bacteria -- 25% below GM 130cfu/100ml SM 300 cfu/100ml	Water sampling before and after upstream and downstream of site.	Watershed Coordinator	CD, PH
Temperatures	High 78°	Surface water must stay below 72° in the summer & sustain temperatures below 65°at greater depths	Max/Min thermometer reading bi-weekly	Watershed Coordinator, Volunteers	MDNR, CD
Altered Hydrologic Flow	Estimated flow of 550 cfs at site 3 see Table 1& Figure 8	Reduced flow rates at site 3 lower that site 2, 500 cfs	Stream morphology study. Bi-yearly testing	Watershed Coordinator, DEQ 3 year study, USFWS lamprey study data.	USFS, MDNR, MDEQ, CD
Invasive Species	Glossy Buckthorn, Spotted Knapweed Present	Contained, no new colonies, or no net gain in acres within the watershed.	Removal, Education Program	Watershed Coordinator, Other agencies, landowners, volunteers.	CD, USFS, NRCS, MDNR
Wetland Protection	Inventory prior converted wetlands, currently 19160 acres	Reestablishment of prior converted wetlands, no net loss of wetlands	Wetland Reserve Program, Education, inventory	Watershed Coordinator, Landowner, Agencies	CD, NRCS

Item to be monitored	Baseline Data	Desired Levels	Monitoring Methods	Monitoring preformed by:	Cooperating agency (s):*
Information & Education Program	Minimal ownership by watershed landowners and users	Ownership of watershed project by landowners and users. 25 new volunteer per year	Practices completed, volunteer numbers, Landowner survey,	Watershed Coordinator	CD
Fisheries	MDNR fisheries Data	Net 25 % gain in fish populations, continued stocking program	In-Stream MDNR Fish sampling, MDEQ 3 year study program	MDNR, CD, Volunteers, MDEQ	MDNR, CD
Other Aquatic Life	Moderate quality based on macroinvertebrates	Maintained healthy populations, high quality based on macroinvertebrates	In-stream survey	CD, MDNR, Volunteers, MDEQ 3 year study	MDNR, CD

* Michigan Department of Natural Resources (DNR), Michigan Department of Environmental Quality (DEQ), US Forest Service (USFS), Natural Resources Conservation Service (NRCS), Conservation District (CD), Delta Menominee Public Health (PH)

Figure 30 Students monitoring the streams macroinvertebrate communities

Existing Projects and Efforts

Streambank Restoration

There are many streambank erosion sites within the priority area of the Days River Watershed. Some of these sites have received a lot of public attention due to the media.

The MDNR has installed 300 ft. of Rock Rip Rap along the bank of the Days River to prevent the potential loss of a home. This bank has been cut back over 15 feet in the past three years. The site was declared an emergency site and was funded to help repair the bank. Rock filled gabions were also removed up stream to help reestablish an old overflow channel.

Figure 31 Gabions removed from bank for overflow channel

Figure 32 Installation of rock rip rap along bank.

The MDNR has also done some restoration and improvement work of the ORV 1 site. The damage to this bank is due to a severe slope, runoff from the slope above, soils, and unauthorized ORV traffic. The local MDNR applied for funding through the ORV trail monies to repair damage to the bank and attempt to stop the ORV use. This project included restoration of the streambank to prevent ORV traffic, bank stabilization due to groundwater seeps, and stabilization of the lamprey weir.

Figure 33 ORV 1 Site Before

Figure 34 ORV 1 Site After

Fish Planting

The MDNR has been planting brook trout in the Days River and it's tributaries since 1985 (Michigan 2004). Locations have been varied in an effort to establish and maintain a fishable population within the Days River (See Appendix C Fish Planting).

Road Stream Crossing

The Delta County Road Commission has replaced culverts as needed and repaired road stream crossings within the watershed. The new construction has resolved the water quality concerns present before culvert replacement. The road commission maintains a road stream crossing for each of the crossings in the county. Road stream crossings are monitored periodically.

Evaluation Plan

Evaluation is an important part of watershed management. It provides the ability to determine how successful your efforts have been. It also provides feedback which allows you the opportunity to reevaluate goals and objectives. If need be, objectives can be modified to meet the needs of the watershed as it changes over time. Evaluation shows changes in knowledge, attitudes, behavior, effectives of best management practices, and changes in watershed conditions.

Based on each goal and the objectives of that goal, the evaluation method will be different for each goal and objective. In the tables above each of the objectives has the evaluation method listed (See Table 8 Objectives). Many of the objectives can be evaluated utilizing the same evaluation procedure. For example morphology studies, macroinvertebrate surveys, erosion studies, and road stream crossing inventory all look at many of the same indicators. Each of them can be beneficial in evaluating many of the objectives set forth in this management plan.

Summary

The Days River is a quality river that has been designated by the MDNR as a coldwater fishery. Water quality and aquatic habitat are considered acceptable to excellent throughout parts of the watershed. The State of Michigan has designated uses for water resources in the Days River Watershed, while they are currently being met, they are threatened by increased "Urban Splatter" and intensified uses of land and water resources. Warm and cold water fishery, partial body contact, total body contact, and navigational uses each face continuing threats from watershed urbanization.

Goals and objectives have been set to preserve and protect the current quality of water resources in the Days River Watershed. The greater purpose of implementing the watershed management plan is to exceed minimum acceptable surface and groundwater quality standards and preserve the resource for future generations. This can be accomplished with implementation of the goals and objectives set forth within this management plan.

The goals described in the Days River Watershed Management Plan address the needs to reduce and control the pollutants, restore degraded water quality and habitat, increase awareness, conduct monitoring, evaluations sufficient to identify pollution problems and measure success. The Management Plan provides a framework to begin this work, but is not a final and complete document as it is. It should remain open to additions and modifications that will best restore and protect the health and function of the Days River Watershed.